Implementation of digital role-playing games in Higher Education classrooms to accomplish learning outcomes

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Implementation of Digital Role-Playing Games in Higher Education Classrooms to Accomplish Learning Outcomes

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Implementation of Digital Role-Playing Games in Higher Education Classrooms to Accomplish Learning Outcomes

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Project Title:

Implementation of Digital Role-Playing Games in Higher Education Classrooms to Accomplish Learning Outcomes of Digital Media Courses

This is to certify that the above named applicant has completed the Coventry University Ethical Approval process and their project has been confirmed and approved as Low Risk

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Dedicated to Mom. Thank you for believing in me.

Special thanks to Trung Nguyen for all these years of dedicated support.

In memory of Paul Verity Smith.

ABSTRACT

Industries have expectations that university graduates possess well-rounded theoretical and practical knowledge to be successful in their jobs. While effective teaching and learning are essential goals in higher education institutions, lessons and learning activities in traditional classroom settings are often out of context, presented to students with much theoretical generality and abstract representations. This leads to a disconnection between academia and industry, where students struggle to apply abstract principles and knowledge in a real-world context to perform effectively in their workplace. Live role-play has been traditionally used as an educational technique to engage students and provide them the opportunity to learn with a real-world context within classroom settings. While role-playing in the classroom encourages transfer of learning, one of its limitation is traditional role-play often does not provide an authentic and believable real-world experience to participants. The primary aim of this study is to converge the pedagogical benefits of role-playing, educational technology and digital games to investigate the effectiveness of using digital role-playing games in classrooms to achieve learning outcomes.

Qualitative data were collected from digital media lecturers of a transnational university based in Vietnam and Australia to identify desirable learning outcomes and describe teaching and learning challenges of digital media courses. Through interviews, lecturers also discussed their perceptions of digital RPGs and their level of acceptance in using this educational technology as part of their teaching practice to accomplish learning outcomes. The results highlighted three key desirable learning outcomes: The first learning outcome is students should develop solid understanding of theoretical and foundational design knowledge, enabling effective application of theoretical knowledge to produce creative digital media outputs. The second learning outcome - students should speak the "*design language*". Students should develop the ability to articulate, critique and explain creative works using appropriate design vocabularies and terminologies, which are used by design practitioners in the industry. The third learning outcome indicated that students should be resourceful and self-sufficient to conceptualise and generate creative ideas. Using Bloom's taxonomy categories, game characteristics and identified learning outcomes, a conceptual framework was developed for the design and use of digital RPGs to achieve learning outcomes for digital media education. In validating this conceptual framework, a 3d digital role-playing game, *Virtual Designer* was developed and implemented in classroom environment. A pre/post-test experimental setup was implemented, in which performance gains were measured and compared between control (conventional learning methods) and treatment group (played digital RPG) to determine the learning effectiveness of digital RPGs. Opinion-based survey and focus group interview was also conducted. Based on collected feedback, students find

Virtual Designer an effective tool to assess their state of knowledge in different areas of design and apply theoretical knowledge into practical contexts. Students find the game to be an engaging alternative to conventional learning methods, but some have commented the game to be too difficult and at times frustrating to play. Lecturers have also play-tested *Virtual Designer* and provided favorable views on the overall feasibility of using similar digital RPGs as a teaching and learning tool to sustain students' interest in learning their subjects – and successfully accomplishing learning outcomes.

Keywords: role-playing games, learning outcome, digital media, knowledge transferal, situated learning, Bloom's taxonomy

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TABLE OF CONTENTS

1 INTRODUCTION 1
1.1 Overview 1
1.2 Motivations and Aim 3
1.3 Research Questions 7
1.4 Proposed Contribution to Knowledge 9
1.5 Scope of Study 12
1.6 Structure of Thesis 15
1.7 Summary 17

2 LITERATURE REVIEW 18
2.1 Introduction 18
2.2 Concepts of Learning 18
2.2.1 The Paradigm Shift 18
2.2.2 Pursuing Performativity 21
2.2.3 Academia and Industry: Bridging the Disconnect 23
2.2.4 The Learning Paradigm 26
2.3 Digital Role-Playing Games 31
2.3.1 Distinguishing Games, Simulations and Role-plays 31
2.3.2 Game-Based Learning 33
2.3.3 Traditional Role-Play 34
2.3.4 Defining RPGs 37
2.3.5 Character role-play 40
2.3.6 Narrative 43
2.4 Methods of Data Collection and Serious Games Evaluation Methods 46
2.5 Summary 50

3 Research Methodology 52
3.1 Introduction 52
3.2 Context of Research 53
3.2.1 Bachelor of Design (Digital Media) Program 53
3.2.2 Digital Media Courses 54
3.2.2.1 Design for Digital Media 1 (DDM 1) 54
3.2.2.2 Design for Digital Media 2 (DDM 2) 55
3.2.3 Participants 55
3.3 Research Design 57
3.3.1 Research Questions Revisited 57
3.3.2 Review of Research Methods 59
3.3.3 Research Approaches 60
3.3.3.1 Quantitative Approach 60
3.3.3.2 Qualitative Approach 61
3.3.3.3 Mixed-Methods Approach 61
3.3.4 Rationale of Using Mixed-Methods Approach 62
3.3.5 Methods of Data Collection 63
3.3.6 Data Instruments 65
3.3.6.1 Semi-Structured Interview 66
3.3.6.2 Pre-Test and Post-Test 66
3.3.6.3 Opinion-Based Survey 67
3.3.6.4 Focus Group Interview 67
3.4 Study Design 68

3.4.1 Study 1: *Virtual Designer* Requirements: Lecturers 71
3.4.1.1 Design of Interview Guide 71
3.4.1.2 Sample Selection Methods 73
3.4.1.3 Data Collection and Data Analysis Method 74
3.4.2 Study 2 – Evaluating the Impact of *Virtual Designer*: Students 75
3.4.2.1 Research Instruments 75
3.4.2.1.1 Pre-Test/Post-Tests 75
3.4.2.1.2 Opinion-Based Survey 76
3.4.2.1.3 Focus Group Interview Guide 77
3.4.2.2 Sample selection methods 77
3.4.2.3 Data Collection Methods 78
3.4.2.3.1 Pre-Test/Post-Test 78
3.4.2.3.2 Opinion-Based Survey 79
3.4.2.3.3 Focus Group Interview 79
3.4.2.4 Data Analysis Methods 79
3.4.2.4.1 Pre-Test/Post-Tests 79
3.4.2.4.2 Opinion-Based Surveys 80
3.4.2.4.3 Focus Group 81
3.4.3 Study 3 – Evaluating the Impact of Virtual Designer: Lecturers 81
3.4.3.1 Design of Interview Guide 81
3.4.3.2 Sample selection methods 82
3.4.3.3 Data Collection Methods 83
3.4.4 Data Analysis Methods 84
3.5 Other Issues 84
3.5.1 Ensuring Validity and Reliability 84
3.5.2 Assumptions and Limitations 86
3.5.3 Ethical Considerations 87
3.6 Summary 88

4 Study 1: Virtual Designer Requirements (Lecturers) 89
4.1 Introduction 89
4.2 Participant Characteristics 90
4.3 Data Collection Method 91
4.4 Discussion Points 92
4.5 Data Collection Procedures 93
4.6 Data Analysis Procedures 94
4.7 Findings 96
4.7.1 Desirable Learning Outcomes of Digital Media Courses 96
4.7.1.1 Learning Outcome 1: Solid Theoretical Knowledge 97
4.7.1.2 Learning Outcome 2: Proficiency in Speaking the Design Language 100
4.7.1.3 Learning Outcome 3: Applying Knowledge 102
4.7.1.4 Other Learning Outcomes 104
4.7.2 Teaching Challenges 106
4.7.2.1 Teaching Challenge 1: Engaging Students 106
4.7.2.2 Teaching Challenge 2: Learner Attitude 109
4.7.2.3 Other Teaching Challenges 111
4.7.3 Learning Challenges 112
4.7.3.1 Learning Challenge 1: Articulating Works 112
4.7.3.2 Learning Challenge 2: Applying Theories into Practice 114
4.7.3.3 Learning Challenge 3: Conceptual Skills 115
4.7.3.4 Learning Challenge 4: Learner Attitude 116
4.7.3.5 Other Learning Challenges 117
4.7.4 Digital RPGs for Digital Media 118
4.7.4.1 Feasibility of Digital RPGs for Digital Media Courses 118
4.7.4.2 Digital RPG Suggestions 119
4.7.4.3 Concerns 123

4.7.4.4 Lecturer's Involvement in Class 124
4.7.4.5 Lecturer's Involvement in Game Development 125
4.8 Discussion 126
4.8.1 Research Questions Answered 126
4.8.2 Theoretical Knowledge 128
4.8.3 "You Should Speak Design." 131
4.8.4 The Classroom and The Real-World: Bridging the Disconnect 133
4.8.5 Digital RPGs for Digital Media Courses 135
4.9 Summary 136

5 Design and Development of *Virtual Designer* 137
5.1 Introduction 137
5.2 How Digital RPG Fits as Bridging Tool in Digital Media 138
5.3 Aligning *Virtual Designer* with Desirable Learning Outcomes 141
5.3.1 Learning Outcomes 141
5.3.1.1 Desirable Learning Outcomes - Study 1 Findings (Lecturer Interviews) 141
5.3.1.2 Desirable Learning Outcomes – University Course Guides 142
5.3.2 Input-Process-Outcome Game Model 144
5.3.3 Designing Digital RPG to Achieve Learning Outcomes: The Conceptual Framework 146
5.3.4 Linking Game Characteristics to Digital RPG 149
5.3.4.1 Fantasy 149
5.3.4.2 Challenge 149
5.3.4.3 Rules/Goals 150
5.3.4.4 Mystery 150
5.3.4.5 Control 151
5.3.4.6 Sensory Stimuli 152
5.3.5 Bloom's Taxonomy Categories for *Virtual Designer* 152
5.4 Designing Virtual Designer 156
5.4.1 Author's Contribution in Developing *Virtual Designer* 156
5.4.2 Preliminary Game Design Considerations 157
5.4.3 Game Environment, Visual Look and Feel 158
5.4.4 Main Scenarios and Side-Missions 161
5.4.5 Main Scenarios 164
5.4.5.1 Main Scenario 1: Preflight a Poster 165
5.4.5.2 Main Scenario 2: Colour Scheme 169
5.4.5.3 Main Scenario 3: Pitching a Logo Design 176
5.4.6 Side-Missions 179
5.4.7 Library 180
5.4.8 Scoring System and "Leveling Up" 181
5.5 Summary 183

6 Study 2: Evaluating the Impact of Virtual Designer (Students) 184
6.1 Introduction 184
6.2 Pre-Test/Post-Tests 185
6.2.1 Research Procedure 185
6.2.2 Analysis of Pre-Test/Post-Tests 187
6.2.2.1 Detecting Outliers and Testing for Normality 188
6.2.2.2 Paired Samples *t*-test 188
6.2.2.3 Summary of Paired-Samples *t*-test Results 193
6.3 Opinion-Based Surveys 197
6.3.1 Research Procedure 197
6.3.2 Pre-Game Survey Responses (Survey Sheet 1) 198
6.3.2.1 Learning Challenges 198

6.3.2.2 Level of Confidence 203
6.3.3 Post-Game Survey Responses (Survey Sheet 2) 204
6.3.3.1 Apply Knowledge into Practice 204
6.3.3.2 Improved Theoretical Knowledge and Soft Skills 206
6.3.3.3 Engagement and Learning Feedback 207
6.3.3.4 Digital RPG for Digital Media Courses 209
6.3.4 Open Ended Questions 210
6.4 Focus Group 220
6.4.1 Research Procedure 220
6.4.2 Pre-Game Focus Group Interview 221
6.4.3 Post-Game Focus-Group Interview 224
6.5 Discussion 227
6.5.1 Learning Challenges and Confidence Level 227
6.5.2 Effectiveness as a Learning Tool 228
6.5.3 Achieving Learning Outcomes 231
6.5.3.1 Solid Theoretical Knowledge 231
6.5.3.2 Applying Knowledge 233
6.5.3.3 Proficiency in Speaking the Design Language 233
6.5.4 Game Fidelity and Engagement 234
6.5.5 Issues 235
6.6 Limitations 239
6.7 Summary 241

7 Study 3: Evaluating the Impact of *Virtual Designer* (Lecturers) 242
7.1 Introduction 242
7.2 Participant Characteristics 243
7.3 Data Collection Method 243
7.4 Discussion Points 244
7.5 Data Collection Procedures 245
7.6 Data Analysis Procedures 246
7.7 Findings 246
7.7.1 Feedback of Virtual Designer 246
7.7.2 Challenges - Difficulty Level 248
7.7.3 Feedback Issues 249
7.7.4 General Gameplay and Usability 250
7.7.5 Feasibility 251
7.8 Summary 253

8 Discussion and Conclusion 255
8.1 Introduction 255
8.2 Summary of Results 256
8.3 Research Question Revisited 257
8.4 Contribution of Study 259
8.5 Limitations 263
8.6 Future Research 264

Reference List 266

Appendix 1: Ethics Approval 273

Appendix 2: Study 1 Interview Guide 274

Appendix 3: Study 1 Coding Frame 277

Appendix 4: Study 2 Pre/Post-Test and Surveys 291

Appendix 5: Study 2 Focus Group Interview Guide 298
Appendix 6: Study 2 Boxplots and Tests of Normality.....299
Appendix 7: Study 3 Interview Guide 303
Appendix 8: *Virtual Designer* Game Design Document.....304

LIST OF TABLES

Table 1 - "What to measure, how and when" - Baalsrud Hauge et al (2013), Mayer et al (2014) 50
Table 2 - Formulated Research Questions of this Study 57
Table 3 - Data Collection Methods and Instruments of Study 65
Table 4 - Studies 1, 2 and 3 - Purposes and Associated Research Questions 70
Table 5 - Interview Guide Overview of Study 1 73
Table 6 - Interview Guide Overview of Study 3 82
Table 7 - Desirable Learning Outcomes of Digital Media Courses 96
Table 8 - Teaching Challenges in Digital Media Courses.....106
Table 9 - Learning Challenges in Digital Media Courses 112
Table 10 - Digital RPG Suggestions for Digital Media Courses.....120
Table 11 - Summary of Desirable Learning Outcomes, Learning Challenges and Teaching Challenges of Digital Media Courses 126
Table 12 - Students did not struggle much with theoretical knowledge, but faced difficulties applying design theories into practice (one of the top desirable learning outcomes). Students also struggle with articulating works using the design vocabularies. 129
Table 13 - Design Language is one of the key desirable learning outcomes. Students struggle with articulating their works effectively. 132
Table 14 - Course Description and Learning Outcomes of Design for Digital Media 1 and Design for Digital Media 2 143
Table 15 - Virtual Designer - Alignment with Revised Cognitive Domain (Adapted from Anderson et al. 2001) 155
Table 16 - *Virtual Designer* – Alignment with Psychomotor Domain (Adapted from Dave 1975) 155
Table 17 - *Virtual Designer* – Alignment with Affective Domain (Adapted from Krathwohl, Bloom, Masia 1973) 156
Table 18 - Performance Objectives and Associated Change and Game Mechanics of Scenarios and Side-Missions in *Virtual* Designer. 164
Table 19 - Sample Size Summary 185
Table 20 - Paired Samples *t*-test (DDM1 Vietnam-Control).....189
Table 21 - Paired Samples *t*-test (DDM1 Vietnam-Control).....189
Table 22 - Paired Samples *t*-test (DDM1 Vietnam-Treatment) 190
Table 23 - Paired Samples *t*-test (DDM1 Vietnam-Treatment) 190
Table 24 - Pre-test and Post-test Mean Scores (DDM2 Vietnam-Control).....190
Table 25 - Paired Samples *t*-test (DDM2 Vietnam-Control).....191
Table 26 - Pre-test and Post-test Mean Scores (DDM2 Vietnam-Treatment).....191
Table 27 - Paired Samples *t*-test (DDM2 Vietnam-Treatment) 191
Table 28 - Pre-test and Post-test Mean Scores (DDM2 Melbourne-Control) 192
Table 29- Paired Samples *t*-test (DDM2 Melbourne-Control).....192
Table 30 - Pre-test and Post-test Mean Scores (DDM2 Melbourne-Treatment).....193
Table 31 - Paired Samples *t*-test (DDM2 Melbourne-Treatment).....193
Table 32 - Design theories are easy to understand through lectures. 199
Table 33 - Design theories are easy to relate with practice through classroom learning. 199
Table 34 - 44.2% students agreed that they were able to recall design theories taught in classes from previous semesters. 200
Table 35 - Student survey responses on whether design vocabularies are difficult to learn through face-to-face lectures. 200
Table 36 - Does the students actively use design vocabularies to communicate with classmates and teachers within classroom settings. 201
Table 37 - Does students face difficulties applying design theories into their practical design works? ...201
Table 38 – Does students face difficulties using design vocabularies to explain their design projects? ..202
Table 39 - Design theories are easy to understand through lectures. 202
Table 40 - Students' self-evaluated confidence level in different areas of design theories and skills. 203
Table 41 - Responses on whether Main Scenarios 1, 2 and 3 in *Virtual Designer* enabled opportunities for students to apply theoretical knowledge into practical situations. 204
Table 42 -– Does playing the scenarios enabled students to perform real-world design tasks more effectively? 205

Table 43 - Did the Main Scenarios enable students to experience standard industry workflows? 205
Table 44 - Did the game improved theoretical knowledge?.....206
Table 45 - Did the game improved additional design skills? 207
Table 46 - Did characters' reactions in Main Scenarios provided good indication of in-game performance? 208
Table 47 - Was there clarity in objectives and were students engaged in answering the questions through conversational responses with characters? 208
Table 48 - Did students find the game useful for learning? 210
Table 49 - Categories for open-ended survey question – what aspects in design did students find it most challenging to learn. 211
Table 50 - Qualitative comments from students.....212
Table 51 - Categories for open-ended survey question - negative aspects of the game.....216
Table 52 – Pre-Game Focus Group Interview Comments 223
Table 53 - Post-Game Focus Group Interview Comments.....226
Table 54 - Study 3 Interview Guide Sections.....244

LIST OF FIGURES

Figure 1 - Research map overview: Research questions and proposed contributions.....11
Figure 2 - Scope of Study Overview 14
Figure 3 - Screenshot from *That Dragon, Cancer (2016)* 44
Figure 4 Screenshot from *Global Conflicts - Palestine* (2007) 45
Figure 5 - Data gathering methods for serious games and games-based learning research (Mayer et al. 2014) 48
Figure 6 - Participation of students (DDM1 and DDM2) and lecturers of the Digital Media program from Vietnam and Australian campuses. 56
Figure 7 - Triangulated Mixed-Methods Design of this Study 64
Figure 8 - Study Design Flowchart.....68
Figure 9 - Situating Digital RPGs as a Bridging Tool for Digital Media Courses.....138
Figure 10 - Input-process-outcome game model (Garris et al., 2002). 145
Figure 11 – Conceptual Framework: Aligning Game Characteristics with Bloom's Taxonomy Categories in Digital RPG to Accomplish Desirable Learning Outcomes.....148
Figure 12 - Players could customise and name their avatar character in the character creation screen. ...159
Figure 13 - A dialogue box appears at the beginning of the game, providing a quick guide on keyboard controls to navigate through the game.....160
Figure 14 - The game environment features a design studio, where players interact with NPCs (Non-Playable Characters) to initiate brief conversations. 161
Figure 15 - Players are required to change the settings on screen to indicate accurate positioning and setting of print elements and specification, before confirming the answers and sending it for print. 166
Figure 16 - An excellent performance in Main Scenario 1 results with a positive reaction from the supervisor, conveying that he is pleased with the player's good performance in executing the task. 167
Figure 17 - An unsatisfactory performance in Main Scenario 1 results with an upset reaction from the supervisor, explaining the costly consequence of making errors in preflighting. 168
Figure 18 - Main Scenario 2 - A colleague requires assistance in preparing alternative colour schemes for a packaging design she made.....170
Figure 19 - A colour wheel indicating the positions of primary, secondary and intermediate colours. Colour schemes could be determined using a colour wheel. This image is provided in the Library section for players that require a quick review of colour theory. 171
Figure 20 - The character explains the task objective in Main Scenario 2's cutscene – to select alternative colour schemes of a packaging design. 172
Figure 21 - In this screenshot, players are presented with an image and asked to identify any possible problems with the logo. Design vocabularies were used in answer selections. 173
Figure 22 - In this screenshot, players are asked to select a split-complementary colour scheme. Clicking on the left or right arrows changes the colour combinations used on the packaging design. A toggle wheel button is available if players need a colour wheel as a visual aid to answer the question. 174
Figure 23 - A design brief is provided and players are asked to pick the best logo design (out of 3 selections) which best aligns with specifications outlined in the brief.....176
Figure 24 - Players are required to pitch a logo to two clients in a boardroom and respond to client inquiries about the design. 177
Figure 25 - The scene displaying the logo before the pitching begins. If the ideal logo design was chosen, the clients will appear impressed with the design. A poor selection will result in clients expressing doubts about the design as the pitch begins.....178
Figure 26 - Clients appear unimpressed with the presentation if the player's performance in Main Scenario 3 was unsatisfactory.....179
Figure 27 - Players may navigate through the studio and approach NPCs to initiate a conversation and begin Side-Missions. 180
Figure 28 - The Library section provides information about key concepts or terms for design theories, enabling students to do quick review before attempting in-game tasks. 181

Figure 29 - A score summary appears upon completion each Main scenario, with a grade of A, B, or C. Players' performance will increase or decrease XP points, indicated by the blue bar at the top of the screen. Filling in the blue bar leads to promotion to a higher position. 182
Figure 30 – Were students engaged to complete the tasks successfully to watch the outcomes of the Main Scenario scenarios?.....209
Figure 31 - Learning challenges in design based on student responses. 213
Figure 32 - Measures students take to improve knowledge in design theories. 214
Figure 33 - Positive aspects of the game 215
Figure 34 – Negative aspects of the game 217

LIST OF APPENDICES

Appendix 1: Ethics Approval **273**
Appendix 2: Study 1 Interview Guide **274**
Appendix 3: Study 1 Coding Frame **277**
Appendix 4: Study 2 Pre/Post-Test and Surveys **291**
Appendix 5: Study 2 Focus Group Interview Guide **298**
Appendix 6: Study 2 Boxplots and Tests of Normality **299**
Appendix 7: Study 3 Interview Guide **303**
Appendix 8: *Virtual Designer* Game Design Document **304**

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1 INTRODUCTION

This chapter describes the motivation and the primary aim of this study. This will be followed with a section outlining the primary and secondary research questions, along with descriptions of research approaches taken to answer each question. The proposed contribution of knowledge will be discussed and the chapter will conclude with an explanation of the overall structure of this thesis.

1.1 Overview

Educators and researchers have in the past challenged society's preconceived notions on highly structured approaches to learning, questioning the efficacy of student learning when education is institutionalised at a massive scale, subjected to excessive rigidity of structure and confinement within the boundaries of traditional learning values and beliefs. As society became increasingly industrialised, the massification of higher education has drastically shifted the emphasis and purpose of tertiary institutions. From its initial focus of shaping the student's mind and character, higher education is now purposed for the transmission of knowledge and skill sets for specific occupations and ensuring students are adaptable towards rapid social and technological changes in society (Altbach 1999; Brennan 2004).

The changes made in higher education system's purposes and functions consequently transformed the dynamics and relationship of the teacher and student. What used to be a mentor-apprentice like relationship has now been reduced to an instructor-student relationship. Personal interactions with students become an increasingly difficult undertaking for academics as class sizes continue to grow as a result of high entry rates into tertiary institutions. The lack of close interaction and guidance from teachers vastly diminishes students' learning experience. Studying

in settings such as large lecture halls, classrooms or labs translates to an impersonal learning experience for students. Traditional teaching approaches such as didactic instruction still predominantly prevails in higher education classrooms, though educators are much more receptive of new and innovative alternative approaches for different learning needs that results with better learning effectiveness.

Today, the creation and delivery of learning content are much diverse, resulting with the emergence of new modes of learning content and delivery (de Freitas and Jameson 2012). Benefiting from the rapid advancement of technology in the past few decades, educational technologies have been constantly evolving. From early drill-and-practice interactive e-learning applications to virtual learning environments (VLE), virtual worlds (for example *Second Life*), Massively Open Online Courses (MOOCs), to serious games, augmented reality and virtual reality. Educational technology has been (and still is) redefining how we learn in and outside of classrooms. Essentially, with the use of educational technology, learners no longer need to be part of a large audience in lecture halls. The learning experience could be conducted asynchronously; eliminating geographical or time constraints that often deter learning. Learning with technology could be a highly immersive experience, in which learners actively participate and engage in their learning journey, thus making learning a pleasurable experience.

This research seeks to combine aspects of the old and the new – drawing upon pedagogical benefits of traditional (face-to-face) role-play and translating this educational approach into digital form through the use of digital role-playing games (RPGs). In doing so, a conceptual framework, comprising of Bloom's Taxonomy categories, game characteristics (Garris et al. 2012) and RPG game mechanics was developed as a generalised framework for the design and development of digital RPGs. The conceptual framework was tested through the development and implementation of *Virtual Designer*, a 3d digital RPG tailored for digital media courses. The game was play-tested at 2 campuses of a transnational university at Ho Chi Minh city, Vietnam; and Melbourne, Australia. Undergraduate digital media students and lecturers participated in this

study and provided feedback on the learning effectiveness and feasibility of using digital RPGs as an educational tool to accomplish learning outcomes.

1.2 Motivations and Aim

The motivation of this research stemmed from this author's interest as an educator, gamer and educational technologist to identify an effective digital tool that could improve students' transferal of theoretical knowledge into practice. From previous teaching experience, a common learning challenge faced by digital media students was to proficiently apply acquired theoretical knowledge into the practice of design. Within classroom settings, students are typically taught theoretical aspects of design through lecture and tutorial formats. Although students demonstrate sufficient understanding on design topics covered in classes, the same level of understanding is not reflected in the actual practice of design, as digital media outputs produced by students often demonstrate a weak grasp of design theory knowledge. Design decisions made in the execution of digital media projects are often not informed by the fundamentals taught in class; and students are unable to articulate how design theories have informed their digital media outputs from concept to completion. In essence, students are unable to establish a connection on how abstract knowledge and principles of design could be applied into real-world digital media projects.

The issue of transfer of learning has been widely discussed and addressed by several learning theories and philosophies. Of close relevance is the situated learning theory, which maintained that successful learning is context dependent – as such, cognitive experiences that are situated in authentic activities results with meaningful learning, which vastly improves learning transfer and application of knowledge into different situations and problems (Lave 1991; Collins et al 1991). Thus, a feasible teaching approach of design theories is to ensure students not only gain a surface understanding on the topic at hand, but also attain a *meaningful* understanding on how these fundamentals of design are used by design practitioners in the context of real-world projects. While classroom settings (lecture halls, tutorial labs) may serve as feasible learning

environments for students to acquire knowledge, the context in which students apply such knowledge and skills differs from how practitioners use their design knowledge and skills in real-world design studios.

Within classroom environments, students learn design fundamentals, vocabularies/terminologies, practical design skills and software skills through formal instructions. Lessons are typically structured in a linear manner as students progressively build their design knowledge. Students are assigned with design tasks, ranging from simple exercises (choose a suitable font for a logo) to full-scale design projects (produce a short 3d animation, design and code a website, etc.). Assignment briefs are very structured, clearly outlining requirements and grading criteria of the task. As they worked on design tasks, students typically receive on-going feedback from their lecturers and classroom peers. As students are still learning new vocabularies of design, they are often required by lecturers to incorporate the use of such vocabularies in their writings and presentations. At the end of each semester, students receive grades for all assignments, before beginning the process of learning the next subject in the following semester.

In real-world design studios, practitioners tackle design tasks rather differently from students. Unlike assignment briefs, client briefs are often less structured. Thus, constant and clear communication with clients is key in determining exact specifications of a project. Design problems are often ill-defined, which requires practitioners to recall prior knowledge and experience before seeking a customised solution for the problem. Practitioners also actively communicate with each other using language of their domain – the design language comprising of design-related vocabularies and terminologies. The design workflow in industry is also different, typically involving processes that rarely occur in classrooms, such as client pitching and team brainstorming.

As previously noted, successful learning is context dependent (Lave 1991; Collins et al. 1991). Situating students in authentic activities would entail in meaningful learning to improve learning

transfer and application of knowledge. This author is interested in bridging the gap between classroom and workplace contexts – to create a simulated workplace environment where students could approach real-world design problems as a practitioner, whilst still gaining and practicing new design knowledge within confines of the classroom. Enabling students to tackle design problems through the perspective of design practitioners would add authenticity in the learning activity, allowing students to establish a meaningful understanding on how learned design theories, skills and vocabularies would apply into the context of a real-world design workplace.

Educators have traditionally used live role-plays to improve aspects of teaching and learning - such as teaching delivery, student engagement and active learning. Sutcliffe (2002) opined that role-play is often regarded as "*the same context as games and simulations*", although little notice has been taken on role-playing as a teaching approach. In parallel with developments within the field of educational technology, the practice of using live role-playing as a teaching approach in educational settings have transgressed into the digital realm. For instance, the emergence of virtual worlds such as *Second Life* in 2003 have enabled learners to assume different identities and control digital avatars to virtually attend meetings, collaborate and interact with peers, or navigate within interactive 3d worlds. Literature has widely acknowledged role-playing as one of the definitive attributes of virtual environments, most often describing how learners are able to role-play through designed mechanics, such as the ability to customise appearances, costumes or control 3d avatars within an interactive space. Rather than viewing role-playing solely as a game mechanic embedded within virtual environments, this study seeks to expand this discussion and examine the practice of role-play as a holistic learning experience within the context of digital games. In essence, how digital games of the RPG genre could potentially be fitted within educational contexts to improve students' learning experience and accomplish desirable learning outcomes. "Digital RPGs" in the context of this study refer to role-playing games that fall into the role-playing game *genre*, which has a combination of common game attributes and mechanics, such as rich narratives (with possible branching dialogues), cut-

scenes, character growth (levelling up), open world, side-quests, etc. For the purpose of this study, a digital RPG is defined as a game genre where the player assumes the role of fictional character(s) within an interactive game environment to complete game objectives through a linear or non-linear narrative structure.

Although commercial video games are not embedded with formal educational objectives, its cognitive advantages have often been debated. Some educational researchers have argued that informal learning does occur by playing video games over an extended period of time. A prominent example is Gee's work (2007), where he identified 36 learning principles in commercial video games – many of which closely links back with pedagogical principles of traditional classroom learning. One of Gee's video game learning principles - the "transfer principle" resonates strongly with the primary purpose of this study. Gee (2007) described how video game players are often afforded plenty of opportunities to practice and transfer previously acquired knowledge into problems at a later time. In addition, given the non-linear nature of video games, players are often required to adapt and reconstruct all acquired knowledge from prior learning to solve unique problems.

Yet, the question remains: Is there a middle ground? How can we channel benefits of educational interactive environments (virtual worlds, simulations, etc.) and video games to attain "*the best of both worlds*" – creating a virtual space that achieves formal educational objectives, whilst not compromising the engaging, immersive and entertaining qualities often experienced in video games? Existing literature on the areas of serious games and game-based learning has indicated how educators have actively embedded game elements and mechanics into educational technology tools. While different game genres - such as strategy games, first person shooters and simulations have been introduced in these studies; there is noticeably a lack of research on games of the RPG genre that were repurposed with formal educational objectives. RPGs have notably formed the largest cohort of best selling game genre in 2013, with popular game titles such as World of Warcraft, Final Fantasy, Dragon Age etc. reporting a huge following of players

and subscribers. Given its popularity, could digital RPGs be translated for classroom use to attain the same level of immersion and engagement whilst students accomplish learning goals? The feasibility of using RPGs for teaching and learning warrants further investigation.

1.3 Research Questions

Having placed consideration on the motivations and key questions - this study is summed up with 1 primary aim:

To converge the pedagogical benefits of role-playing, educational technology and digital games to investigate the effectiveness of using digital RPGs in classrooms to achieve learning outcomes.

Based on the primary aim, a number of research questions have been formulated. Each research question consists of additional sub-questions, which concretize the research approach and research design of this study (Chapter 3). The primary research question is as follows:

Primary Research Question:

Could digital RPGs be implemented in classrooms as an effective learning tool for students to accomplish learning outcomes of digital media courses?

S1: Did digital media students experience a performance gain in theoretical and practical design knowledge after using digital RPG as a learning tool?

S2: Did students find that the use of digital RPG as a learning tool was effective in helping them overcome existing learning challenges faced when studying digital media courses?

S3: What are students' opinions about the feasibility of using digital RPGs as learning tools for digital media courses?

S4: What are the opinions of lecturers about the feasibility of using digital RPGs as teaching and learning tools in classrooms to improve students' theoretical and practical design knowledge?

Acquired findings of 2 secondary questions will inform the primary research question:

Secondary Research Question 1 (S1):

What features or elements of digital RPGs could be used for students to accomplish learning outcomes and overcome learning challenges in digital media courses?

S1.1: What learning challenges do students commonly face when studying digital media courses?

S1.2: What teaching challenges do lecturers commonly face when teaching digital media courses?

S1.3: Which features or elements in a digital RPG did students find the most useful in accomplishing learning outcomes and overcoming learning challenges?

S1.4: Which features or elements in a digital RPG did lecturers find the most useful in accomplishing learning outcomes and overcoming teaching and learning challenges?

Secondary Research Question 2 (S2):

Which types of learning outcomes in digital media courses could best be supported through digital RPGs?

S2.1: What are the desirable learning outcomes of digital media courses?

S2.2: Which features in digital RPGs could best support these desirable learning outcomes?

S2.3: How could in-game tasks be designed in digital RPGs to align with learning outcomes of digital media courses?

1.4 Proposed Contribution to Knowledge

This thesis proposes the following contribution of knowledge:

Theoretical

Based on qualitative input from lecturers and evaluation of formal university course guides, desirable learning outcomes of digital media education will be identified. This study extends the use of Bloom's taxonomy for use within the context of using digital RPGs for digital media education. Linking Bloom's taxonomy categories, RPG game characteristics and identified learning outcomes, a conceptual framework will be developed for the design and use of digital RPGs to achieve learning outcomes in the context of digital media education. This will be a generalised framework that could be adapted for undergraduate courses of different discipline areas that would benefit from the design and use of digital RPGs as a learning platform to engage and promote active learning.

Methodological

To validate the conceptual framework, a digital RPG will be developed, which will be tailored specifically for first year students of the Digital Media degree program. The overall design and learning content of the game will be informed by interview feedback from digital media lecturers, formal university course guides, lecturer and tutorial class materials, etc. The use of digital games has yet to be actively investigated in the field of digital media education (games are catered primarily for disciplines such as business, math, history, healthcare etc). The development of this digital RPG is original in its premise, as it is developed specifically for digital media courses with the objective of improving transferal of design theory knowledge into practice, effectively bridging the gap as students transition from learners to design practitioners.

Empirical

Although digital media students are the targeted users of the digital RPG, it is essential to consider the lecturers' input as educators, practitioners and subject-matter experts on the overall feasibility and effectiveness of digital RPGs as a learning tool to achieve desirable learning outcomes. Therefore, this research will consider perspectives of both learners and educators. Empirical evidence will be collected quantitatively to statistically measure performance gains in students' test score after using digital RPG for their learning. Qualitative feedback will also be collected to elicit feedback on students' thoughts about the effectiveness of using digital RPG for their learning. Lecturers will provide qualitative feedback on typical teaching and learning challenges faced in class, as well as desirable learning outcomes of digital media courses. Lecturers will also play the developed digital RPG and provide feedback on the feasibility of using this as a teaching and learning tool for digital media courses. The combined findings from these triangulated data sources will contribute towards the present gap of literature on 3 fronts – (1) learning effectiveness of digital RPGs in higher education classrooms, (2) lecturers' feedback on teaching and learning challenges, as well as desirable learning outcomes in the context of digital media education, and (3) the learning effectiveness of using digital RPGs in the context of digital media education.

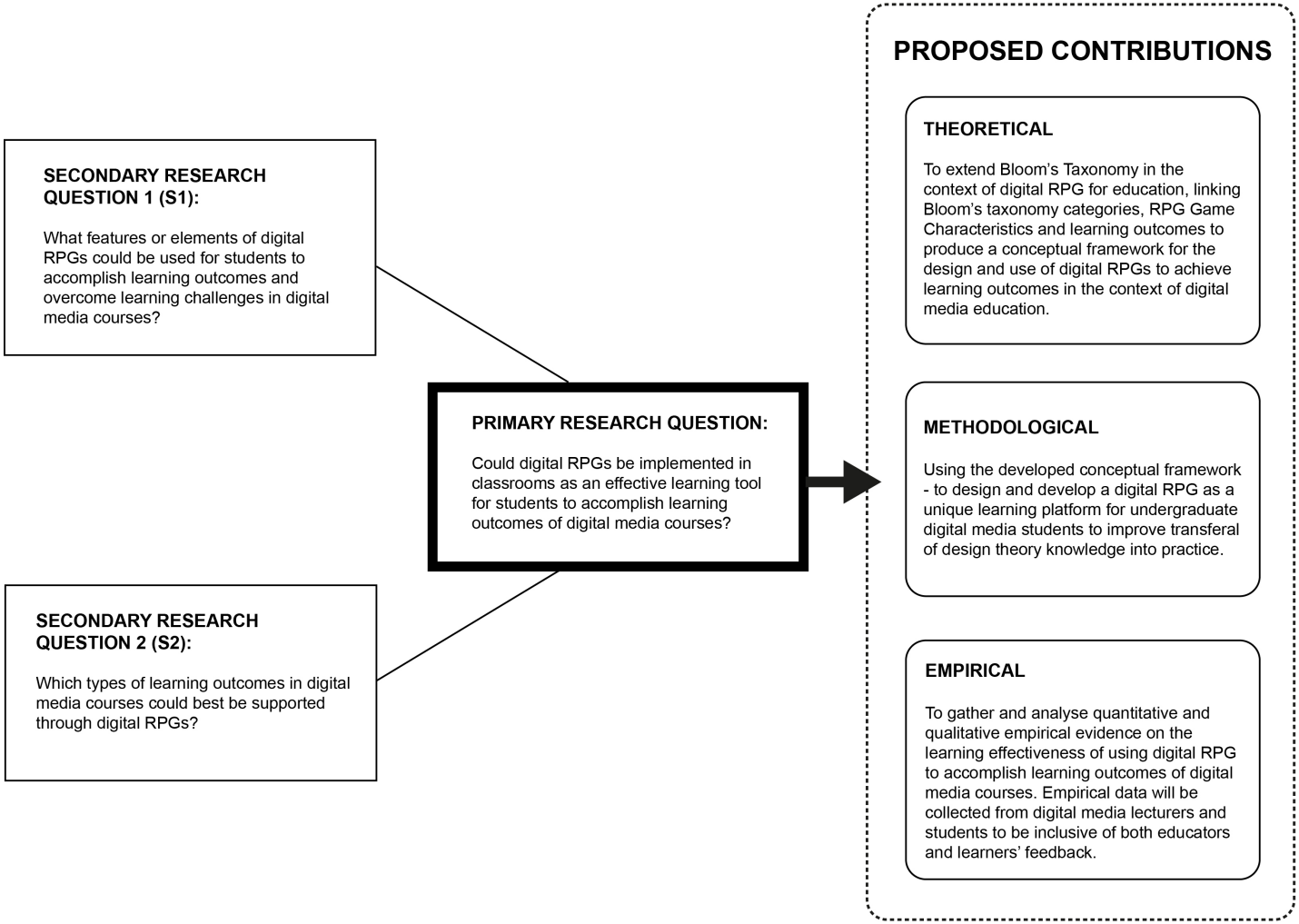

Figure 1 - Research map overview: Research questions and proposed contributions.

1.5 Scope of Study

While the findings of this study are relevant within a global context, this author recognises that it is a gross over-generalisation to assume that findings will apply to all university courses and students worldwide. Hence, it is essential to define the context of course characteristics and student demographics, which may have stronger relevance with the findings of this study. Although the courses chosen for this study (Design for Digital Media 1 and Design for Digital Media 2) falls in the discipline area of digital media, courses of different discipline areas with similar course structures and characteristics will find relevance in findings of this study.

Findings of this study will apply to undergraduate level courses that are structured with a traditional university lecture and tutorial format. The lecture sessions are conducted through face-to-face teaching, primarily to deliver lesson materials, which are often theoretical based. The tutorial sessions are delivered within smaller classroom settings with more emphasis on peer-to-peer interaction, critique and collaborative discussions. Tutorials could also be conducted within computer laboratories, where students learn practical and technical skills through the facilitation of lecturers or tutors. Most often, assigned tasks or classroom activities in tutorial sessions are relevant with new concepts and theories presented during lectures, requiring students to transfer knowledge: converging their theoretical knowledge with practical skills to successfully complete tutorial tasks.

Findings of this study will be applicable to undergraduate courses that have a balanced teaching approach on theory and practice to produce a tangible output that meets standard industry practices and expectations. The nature of works produced is most often project-based on either team or individual basis with a clearly defined process and timeline. Works produced could be digital or non-digital in nature, but demonstrates creative thinking and innovative problem solving

in adhering to briefs. Courses that focus on developing soft skills, such as communication, team work and time management skills will also be relevant with findings of this study.

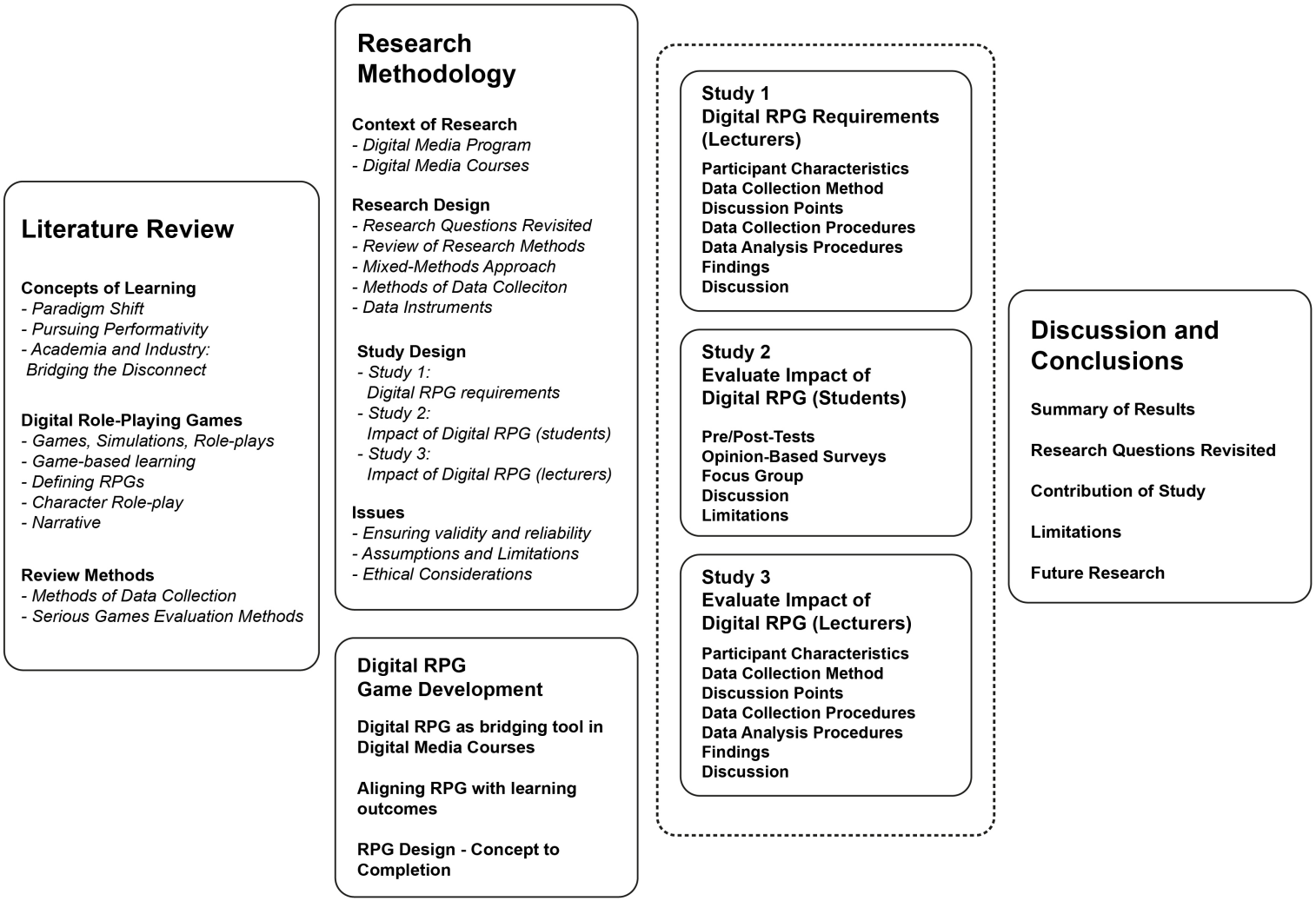

Figure 2 - Scope of Study Overview

1.6 Structure of Thesis

This thesis presents the process and results of the 4-year study, which consisted of 4 sequential phases:

Phase 1: Study 1 (3 months) – Semi-structured interviews were conducted with digital media lecturers to discuss teaching and learning challenges, desirable learning outcomes, feasibility and possible uses of digital RPGs for digital media courses.

Phase 2: Game Development (6 months) – Based on identified learning outcomes in Phase 1 - Garris et al's (2012) game characteristics, RPG mechanics and Bloom's Taxonomy were aligned and used as basis for the development of a conceptual framework for digital RPG game and learning design. Using this conceptual framework, a 3d digital RPG – *Virtual Designer*, was designed and developed. Lecturers' feedback from Phase 1 (Study 1) played a role in informing the game design of *Virtual Designer*; ensuring instructional goals were adequately met, whilst keeping the game engaging to play.

Phase 3: **Study 2** (4 months) – Upon completion of *Virtual Designer's* development in Phase 2, the game was play-tested in classrooms by undergraduate digital media students at two campuses (Vietnam and Australia). Students provided quantitative (surveys, tests) and qualitative (focus group discussions) feedback on the overall learning effectiveness and feasibility of digital RPGs to accomplish learning outcomes in digital media courses.

Phase 4: **Study 3** (3 months) - *Virtual Designer* was play-tested by digital media lecturers. Lecturers were interviewed and provided feedback on the learning effectiveness and feasibility of using digital RPGs as a teaching and learning tool to accomplish learning outcomes and overcome teaching challenges in digital media courses.

This thesis will be structured into 8 chapters:

Chapter 1 - Introduction

Chapter 2 - Literature Review

Chapter 3 - Research Methodology

Chapter 4 - Study 1 – *Virtual Designer* Requirements (Lecturers)

Chapter 5 – Design and Development of *Virtual Designer*

Chapter 6 – Study 2 – Implementing *Virtual Designer* (Students)

Chapter 7 – Study 3 – Implementing *Virtual Designer* (Lecturers)

Chapter 8 – Discussion and Conclusion

Chapter 2 will present a review of past and recent literature relevant to the scope of this study. Chapter 3 presents the research methodology and how Studies 1, 2 and 3 are aligned in answering the formulated research questions. It will also discuss data collection methods and participant characteristics. Data collection procedures and data analysis methods will be elaborated in detail in each of the study's respective chapter - Chapters 4, 6 and 7, in addition to findings and discussions relating to analysed data of each study. Chapter 5 presents the conceptual framework of RPG design and a detailed walkthrough of *Virtual Designer*'s game and learning design. Lastly, the thesis concludes with Chapter 8, which summarises all findings. Limitations of the study will also be discussed and suggestions for future research will be provided.

1.7 Summary

To reiterate, the aim of this study is to converge the pedagogical benefits of role-playing, educational technology and digital games to investigate the effectiveness of using digital RPGs in classrooms to achieve learning outcomes. The research questions are as follows:

- **Could digital RPGs be implemented in classrooms as an effective learning tool for students to accomplish learning outcomes of digital media courses?**
- **What features or elements of digital RPGs could be used for students to accomplish learning outcomes and overcome learning challenges in digital media courses?**
- **Which types of learning outcomes in digital media courses could best be supported through digital RPGs?**

This study will be conducted in 4 phases:

- **Phase 1 - Semi-Structured Interview with digital media lecturers. (Study 1)**
- **Phase 2 – Development of digital RPG.**
- **Phase 3 – RPG play-testing by digital media students. (Study 2)**
- **Phase 4 – RPG play-testing by digital media lecturers (Study 3)**

The next chapter (Chapter 2) will present a review of past and recent literature, spanning an overview of higher education, the present gaps of teaching and learning, the use of RPG in entertainment and teaching and learning, and a review of research methods that will be feasible for the purpose of this study.

2 LITERATURE REVIEW

2.1 Introduction

As discussed in Chapter 1, this study seeks to translate pedagogical benefits of face-to-face role-play into digital form through the use of digital role-playing games (RPGs), and investigate its learning effectiveness as a digital tool to accomplish desirable learning outcomes. Chapter 2 presents a review of literature relating to key areas of this study. This chapter is divided into four sections. The first section relates to the concepts of learning, describing the paradigm shift in higher education and approaches to bridge the existing disconnect between academia and industry. The second section presents an overview of game-based learning and the associated pedagogical benefits reported in past literature. The third section explores the topic of role-play, providing an overview of traditional (face-to-face) role-play as a teaching methodology, before transitioning into a discussion on role-playing games (RPGs) and how games of this genre could be harnessed for teaching and learning purposes in classroom environments. Lastly, the fourth section presents the philosophical grounds of research methods that will be used, along with overall rationale of research approaches that will be implemented to address the formulated research questions of this study.

2.2 Concepts of Learning

2.2.1 The Paradigm Shift

Higher education has undergone massive changes since 2000. Increased participation rates has brought upon larger diversity in student population, alongside other contributing factors that have transformed the main purposes of higher education, even changing modes of delivery (Biggs and Tang 2007). Hence, it is inevitable that higher education expansion has also brought upon sizeable transformations towards teaching and learning practices of tertiary institutions today.

Innovative approaches, methodologies, tools and technologies have emerged in keeping up with new demands and challenges of teaching and learning in the modern day classroom. Suffice to say, students' overall learning experience from higher education today is of stark contrast in comparison with higher education learning in preceding decades.

Whilst pedagogical approaches in higher education classrooms have been constantly evolving, some conventional practices remain unchanged over the years of higher education expansion. For instance, didactic instruction is still practiced in higher education institutions as a mode of delivery of learning content in traditional formats of lectures and tutorials. Such traditional view of teaching-centered instruction is conceived from the early ideas of Aristotle, who perceived a child's uneducated mind as a "clean slate" without any instinctive ideas. Structured by hierarchies consisting of tutors and pupils whilst reinforced with assessments, the novice advances through the stages of turning into an expert by means of book or repetitive learning (de Freitas and Jameson 2012). The didactic view perceives teachers as experts in specific domains of knowledge. In this context, the teacher's job is to transmit their expertise in the domain by means of lectures and recitations, while students are on the receiving end to acquire knowledge by memorizing facts and concepts, practicing the skills until achieving eventual mastery of the knowledge or skill (Collins 1991). Richardson (2008) noted that a number of scholarly works have described traditional didactic lecture as comparatively passive and less effective teaching tool in comparison with active learning methods such as problem-based learning. However, he stressed that a well-organized didactic lecture can indeed be an effective mode of delivery to synthesize and present information of complex topics from various sources.

Of relevance with the notion of didactic instruction are Biggs and Tang's (2007: 127) discussions on university teaching. They wrote, "*The view of university teaching as transmitting information is so widely accepted that teaching and assessment the world over are based on it. Teaching rooms and media are specifically designed for one-way delivery. A teacher is the knowledgeable expert, the sage on the stage, who expounds the information the students are to absorb and report back*

accurately." They emphasized that students' learning can primarily be subdivided into two approaches – surface learning and deep learning. Surface learning refers to an approach that involves rote memorization and verbatim recall without fully understanding the learning content (but rather, provides *false impression* of attaining understanding in the subject). Deep learning is deemed as a more desirable and effective learning approach, where students are motivated to focus on identifying "*underlying meanings, on main ideas, themes, principles or successful application*", with the intention of engaging in tasks much more meaningfully and appropriately. Noting that the format of lectures and tutorials may have been effective for higher education in earlier days when highly selected students tended to engage in deep learning, Biggs and Tang (2007) stressed that such formats may not be effective for the learning needs of students today. They further noted the necessity of establishing a proper teaching context to cater for students that may be lacking deep learning ability.

Looking into higher education instruction at a larger scale, Barr and Tagg (1995) suggested that higher education is experiencing an imminent paradigm shift from Instruction Paradigm to a Learning Paradigm. The Instruction Paradigm, they explained, has traditionally dominated tertiary institutions, where its core purposes were to offer courses and deliver instructions to students. Institutional outcome of this older paradigm primarily focuses on the instructional aspect of higher education (rather than student learning), thus faculty well-being and success tends to be prioritized over actual learning outcomes of students. Elements of the Instruction Paradigm conflicts with Illich's (1971) early discussion in "Deschooling Society", in which he addressed "the myth" of institutionalized values in education and questioned the common beliefs that instruction creates learning. In Illich's (1971) words:

"*In school we are taught that valuable learning is the result of attendance; that the value of learning increases with the amount of input; and, finally, that this value can be measured and documented by grades and certificates. In fact, learning is the human activity which least needs manipulation by others. Most learning is not the result of instruction. It is rather the result of*

unhampered participation in a meaningful setting. Most people learn best by being "with it", yet school makes them identify their personal, cognitive growth with elaborate planning and manipulation."

Arguing that traditional learning and educational systems were corrupting and have backpedalled from their original purpose through a counter-productive process, Illich's views, though controversial for his time, have highlighted consequential problems from rise of institutions that lead to subsequent detriment to individuals (de Freitas and Jameson 2012), adding a fresh perspective towards the education system in general and prompted educators and researchers alike to re-examine the efficacy of teaching and learning approaches in educational institutions; that perhaps, the traditional approach isn't the only way for effective teaching and learning after all.

2.2.2 Pursuing Performativity

Gilbert (2007) described "*performativity*" as a key attribute of knowledge, referring to one's ability to selectively pick elements from different knowledge systems and create new forms of knowledge. As such ability requires advanced level of comprehension in all the existing knowledge systems that were being used, the emphasis of books, articles or experts as traditional conceptions of knowledge is vastly reduced. Instead, emphasis is added for learners to acquire professional knowledge to pursue "*performativity*", allowing knowledge to be innovatively applied or adapted into new situations. Bereiter and Scardamalia (2005) queried if education systems have actually kept up with the needs of knowledge society, as it is rare to find students engaged in adapting and applying new forms of knowledge within an educational setting. Likening early education systems as "*production lines*", Gilbert (2007: 6) illustratively described how students typically progress through academic systems:

"*Students are "processed" through the system in "batches" (known as year groups of classes). A pre-set curriculum is delivered to them in a pre-set order by people who specialize in different*

stages of production. The tasks to be completed are broken down into bite-sized pieces. Students are guided through each stage in a way that, while it allows them to gain certain specific skills ("the basics"), actively prevents them from seeing and understanding the big picture of what they are learning. As they pass through the system, students are subjected to various "quality control" devices, designed to access whether or not they measure up to the system's standards."

Laurillard (2002) observed that teaching methods in educational institutions did not sufficiently evolve to keep up with knowledge society needs, further stating that the traditional transmission model is still being applied as a primary pedagogical approach, with lectures, books and graded assignments used as standard formats of teaching and learning. This view is supported by Hargreaves (2003: 1), who noted that higher education standards have devolved into an undesirable state of compulsive obsessive standardization, where many school systems are increasingly micromanaging the standardization of curriculum and confined within the narrow vision of "*test scores, achievement targets and league tables of accountability*". Yet, such attempt of compartmentalizing knowledge into standardized units that can be measured quantitatively and qualitatively is essentially a flawed effort, for knowledge simply could not be measured objectively.

Even within the context of learning societies, knowledge is central amongst all ongoing exchanges (Glenn 2010) and many essential varieties of knowledge simply could not be adequately explained with standard sentences or rules (Bereiter and Scardamalia 2005). Thus, it is vital to advance beyond obsolete methods of the industrial age and eliminate the traditional one-size-fits-all, production-line models of education. Instead, new models of education should adapt to reflect flexibility, diversity and refreshing ideas of ability (Gilbert 2007). It is imperative that higher education institutions carefully evaluate its current curriculum and teaching practices to ensure graduates possess desirable knowledge worker skills, attributes and traits, which are suited and relevant to current industry needs.

2.2.3 Academia and Industry: Bridging the Disconnect

Previous literature have acknowledged learning transfer as a prevalent problem in universities, observing students' inadequacies of applying abstract "text book" theoretical knowledge into practical workplace settings to solve complex real-world problems or situations (San Chee 1995; Hennessy 1993; Collins et al. 1991). Whilst overtly academic curriculum is commonly faulted as a contributing factor that leads to learning transfer difficulties, numerous other underlying causes have been identified, such as ineffective teaching delivery modes, different contexts of learning, authenticity of assessment tasks, etc. One approach in bridging the disconnection between academia and industry is by substituting academic curriculum with authentic work experiences. This is commonly accomplished in universities through work placement programs, where students are placed in companies as interns for a designated timeframe, engaging in real-world tasks to attain work experiences. Such initiatives are based upon the argument that academic subjects in higher education institutions represent a structured body of knowledge and could not be simply substituted with real-life employer or work culture (Spours and Young 1988).

Grubb (1985: 534) noted that a drawback of work-experience programs is how such programs are often held within a short timeframe, thus insufficient for students to truly benefit from the experience, further noting its lack of educational value. Drawing comparisons between apprenticeship and work-experience programs, he wrote:

"*School-based programs tend to substitute small amounts of work for what would otherwise be academic coursework, whereas apprenticeship programs are largely work based and may add some academic preparation on top of employment. Apprenticeship programs are "real work", then, whereas work-experience programs often appear to be simply "playing at work" or working at jobs with no particular educational value*."

The perspective that schools could not reproduce authentic work experience warrants further exploration, as it is explanatory on why work experience programs such as lengthy internships are still commonly part of university curriculums today - to allow students the opportunity of gaining invaluable work experiences from industry exposure, which could not be otherwise acquired through formal education experience within classrooms. Knowledge and skills are acquired, developed and practiced differently in work and higher education settings – both of which are very contrasting environments (Saunders and Machell 2000). Hence, attempting to forcibly embed both work and academic elements into one cohesive curriculum will potentially entail with compromised academic standards.

As Grubb (1985: 534) pointed out: "*Schooling is not work and cannot become work; it can be made more like work but only at the cost of undermining the conventional curriculum of instituting new tracking mechanisms*." This statement rings true to an extent, although it is worth reconsidering if this is still applicable within the context of higher education systems today. Is there a possible way to seek a middle ground, which allows higher education institutions to convincingly simulate work scenarios or situations; enabling students to engage in practical work tasks and acquire simulated working experiences - all within classrooms settings? This forms the main premise of this study, which will investigate the feasibility of digital role-playing games as a tool for students to accomplish desirable learning outcomes and experience simulated workplace scenarios within classroom settings.

Another view on adding industry relevance to higher education learning embodies the idea of expanding traditional academic practices of universities to develop a range of desirable higher order skills and professional attributes among students, such as social and communication skills, problem solving skills, collaboration skills, reasoning skills, etc. This view does not disregard the importance of technical or specialized skills, but stresses that the higher education experience should be distinctly indicative to students on what to expect in real-world work (Saunders and Machell 2000). This view adopts the approach of curriculum renewal to develop desirable

graduate attributes and skills. For instance, the formulation of activities that require students to practice their acquired skills and knowledge on tasks that are oriented towards common working practices, such as working in projects, in collaborative team settings and social/communication skills development (Saunders and Machell 2000).

Litchfield et al. (2010: 532) acknowledged that whilst curriculum renewals in universities for development of professional skills and attributes could never supersede the authentic real-world experience that work placement offers, such initiative does has its merits. They added, "…*through curriculum renewal universities can more systematically address student learning of professional attributes, together with the traditional body-of-knowledge of each discipline and profession. These pedagogic aims and outcomes are not incompatible and can be combined to support each other."* Indeed, university academic curriculum and concrete real-world work experience can be complementary of each other to create a well-rounded learning experience for higher education students. Addressing the division of academic knowledge and experience, Spours and Young (1988: 11) proposed that teachers should look past the divide between academic and vocational courses and instead harness academic knowledge to critically examine real-world work. They wrote:

"The question raised by the "new vocationalist" initiatives is whether the division between the academic/vocational which is so widely deplored can be overcome by new forms of active pedagogy and experience-based curricula alone. It is our view that such a change requires not just new pedagogic strategies but more imaginative attempts to create links between academic knowledge and experience."

Several projects mentioned by Saunders and Machell (2000) serve as ideal examples of creative means that teachers could take to bridge academic knowledge with experience effectively. For instance, students were given the opportunity to undertake real-world projects and assignments - history students wrote local history guidebooks, whilst law students played the role of supervised advisers and provided free legal information service. These examples contrast from generic

classroom assessments tasks, as such projects add layers of authenticity in students' learning, enabling an increased depth of situated understanding and experience whilst drawing upon student's conceptual knowledge to apply into actual practice within a real-world context.

2.2.4 The Learning Paradigm

The Instruction Paradigm of higher education, which is based upon teaching values and approaches that are perceived by many as ineffective; is gradually shifting towards the Learning Paradigm (Barr and Tagg 1995). Rather than placing focus on instruction delivery, the Learning Paradigm frame learning holistically and is centered towards producing learning, where tertiary institutions take accountability in students' learning and success. Instead of solely purposing tertiary institutions for knowledge transfer, the Learning Paradigm strives to create ideal learning environments and experiences for students to self-construct and discover knowledge, enabling effective discovery learning and problem solving. While the Instruction Paradigm appears to lean towards the didactic view of education, the Learning Paradigm indicates a constructivist view of learning.

Collins (1991) observed that both opposing views of didactic and constructivist teaching education have in the past been widely debated, though didactic view tends to prevail among the general public. The constructivist learning theory, derived from the works of Jean Piaget, John Dewey, etc., emphasized the idea that meaningful learning is acquired by means of active inquiry. Piaget rejected the notion of learning by means of repetition and rote memorization, instead believing that effective learning should be based upon the learner's authentic experience. From the constructivist's point of view, teachers are mediators of learning, acting as facilitators to assist students in constructing their own understandings and abilities of completing tasks (Collins 1991). Through the active process of creating hypotheses and forming new understanding through activities, students construct meaning throughout the learning process (de Freitas and Jameson 2012). Building upon the constructivism theory, Lev Vygotsky added a new perspective, introducing the notion of social aspect as a central element of effective learning. Vygotsky (1978)

stressed that interaction, guidance and collaboration between the student, teacher and peers plays a crucial role in cognitive development.

In recent years, educators have acknowledged the essentiality of applying active learning techniques to improve student engagement and learning effectiveness in classrooms. Shifting away from traditional lecture delivery formats which often renders passivity in students' learning experience, research literature indicated a proliferation in the use of non-conventional pedagogical approaches to foster active learning, such as debates, drama, game design, etc. (DeNeve and Heppner 1997). In addressing the issues of passive learning and its impact on learning outcomes, Aubusson et al. (1997) described how a group of science teachers observed that students were parroting words taught in class, but struggled with communicating scientific ideas using their own vocabularies. Noting how students lacked the ability of applying scientific knowledge into new situations, the teachers attributed these issues towards an overall lack of in-depth understanding of learning content taught in class. The observations made by the science teachers illustrate Biggs's (1989) views on the *quantitative* conception of learning. Biggs's (1989) three conceptions of learning – quantitative, institutional and qualitative describes common perceptions of learning and the effects it has upon different approaches of teaching and learning.

Describing the *quantitative* conception of learning, Biggs's (1989:8) wrote: "*Learning is a matter of how much is learned*." Lecturers with a quantitative conception of learning perceive curriculum as a body of factual knowledge and transmittable skills, in which assessment tools such as tests are used to measure learning outcomes. As educational institutions place more focus on teaching general theories and skills, San Chee (1995) noted the omission of situation-specific learning, which negatively impacts students' ability to transfer knowledge from schools into real-world situations. It has been argued that legitimate learning goes beyond the attainment of content-level knowledge. Citing Unger's (1993) study, Biggs (1996) described how students' understanding of subject content is structured within a general hierarchy, where the level of understanding varies from surface-level knowledge - by means of memory recall without full comprehension on the

subject matter; to the attainment of meaningful understanding, demonstrating the ability to concretely apply knowledge across unprecedented situations. Referring to the Harvard Project Zero Team, Biggs (1996: 351) wrote:

" The Harvard Project Zero team (Gardner 1993, Perkins & Blythe 1993, Unger 1993) focus on the performative aspect of understanding; that if you understand something properly you act differently in contexts involving the content understood, particularly unfamiliar contexts. Such "performances of understanding", as they term them, require students to interact thoughtfully with a novel task, to reflect on appropriate feedback, to search to see how they can improve. These performances are not required in most tasks presented in school or even in university."

Reverting to the earlier discussion on performativity (Section 2.2.2), the core ideas of performative understanding were often linked with discussions relating to transferal of knowledge from formal education into real-world work place contexts. In one example, Gilbert (2007) stressed that in pursuing performativity, learners go beyond the boundaries of acquiring professional knowledge and demonstrate the ability to selectively adapt and apply acquired knowledge into varied situations. As previously described, early literature have indicated the common stance of viewing education in a traditionalist's view, where core functions of universities were primarily perceived as academic institutions to instill intellectual inquiry. This view has gradually shifted over the years, with calls for expansion of traditional academic practices in universities to instill professional skills and attributes into students. As such, higher education institutions have sought different measures to achieve closer alignment between university teaching and industry needs in effort of increasing work-readiness amongst graduates, for instance - incorporating work-integrated learning components into curriculums, internships, work placements and work preparation programs.

In addition, calls for innovative teaching in higher education have been made to address the common debates on the "academic versus industry" gaps of knowledge. Active learning

techniques for example was favored as a comparatively effective teaching approach, although arguably there is a lack of research literature to evident the actual efficacy of teaching methods associated with active learning (Deneve and Heppner 1997). Naidu et al. (2000) noted the necessity of shifting teaching focus from content-centered approach to problem-based approach to ensure students are well-prepared for challenges as they transition from formal education into work environment.

Yet, working within limitations of classroom environments, to embrace the idea of performativity and embed work-ready knowledge or skills into existing academic teaching practices is a challenging undertaking for educators. The disparities of context between formal education and the real world in particular have been informed by several educational theories. Notably, the situated learning theory recommends a revisit on the notion of learning, informing that the essence of learning should not be constricted within the contexts of formal education alone, but rather, recognizing that learning is also attributed to an individual's personal experience of social practices within the real-world, through legitimate peripheral participation in communities of practice (Lave 1991).

The second conception of learning is *institutional*. Contrary to the quantitative conception of learning, the institutional view shifts the focus away from the educators and places the emphasis on the role of educational institutions in society. It refers to how universities are perceived as institutions that validates learning – offering accreditation that graduates have acquired all necessary knowledge, met required standards and are qualified experts of their respective fields. Such a view leads to increased complexities in structures implemented across issues of teaching and accreditation, which Biggs (1989) noted could pose detrimental effects to student learning. Indeed, the trend of credentialism has become prevalent as society places a strong emphasis in the acquisition of formal academic qualifications (Altbach 1999; Marks 1999), in which formal education is a pre-requisite of joining most professions today (Grubb and Lazerson 2009).

The third conception of learning is *qualitative*, which places the emphasis on the learner and the relation between knowledge with one's interpretation of the world. Biggs (1989: 9) wrote:

"Learning involves a way of interpreting the world. Knowledge is progressively constructed by learners on the basis of what they already know; the frameworks so constructed become the means by which learners interpret their experience (Driver and Easley, 1976; Pines and West, 1986). Many tertiary teachers see their discipline as involving particular qualities of thinking and problem solving, and want their students to acquire that way (Entwistle, 1984). Most institutions frame their educational goals, if not their practices, in qualitative terms, emphasizing the changed perceptions and competencies resulting from learning."

Biggs's (1989) three conceptions of learning remains relevant with teaching and learning practices of tertiary institutions today, as it offers a succinct overview on common perceptions of what constitutes as learning and how these different interpretations would impact academic and teaching standards of higher education classrooms. In particular, the qualitative conception of learning is of interest in this study. Challenging the traditional views of learning, it argues that meaningful learning requires more than the acquisition of content knowledge through classroom learning or textbooks. Rather, knowledge is constructed progressively through an individual's experiences and situations encountered outside of classrooms. In other words - knowledge and meaning is constructed through one's interpretation of the world. How can students step beyond the contexts of classroom learning and apply acquired knowledge into real-world situations? How can educators ascertain that students attain meaningful understanding of the taught subject matter and demonstrate competencies of applying acquired knowledge into real-world situations? Most importantly, in the process of embedding work-ready knowledge and skills within formal education contexts - existing academic standards of tertiary institutions should not be compromised.

2.3 Digital Role-Playing Games

2.3.1 Distinguishing Games, Simulations and Role-plays

The terms games, simulations and role-play are often used interchangeably. All three forms situate players within fictional or real-world environments, where players are presented with situations or problems to act upon. Beyond this commonality however, there are distinctions between the games, simulations and role-plays (Sutcliffe 2002).

Games are often based on fantasy and structured with rule-sets which players adhere to, entailing an eventual win or lose outcome (Panoutsopoulos et al. 2014; De Freitas and Maharg 2011, Sutcliffe 2002; Gee 2003). Games could be categorised as different genres – role-playing games (RPGs), first person shooters, strategy games, action adventure games, sports games, etc. Games of the same genre often share similarities in the general interface and usability design. As such, genres could be utilised as conceptual framework to determine design and usability issues in games and adapting different design approaches for games of specific genres (Pinelle et al. 2008). Games of the same genre also share similar characteristics and game mechanics. For instance, strategy games have lesser dependence on the use of cinematics. These games share a similar aesthetic style – a "*god's-eye-view*" depicting ongoing actions of the game world, differing considerably from games of other genres (Apperley 2006). On the contrary, shooter games are often presented as 1st person or 3rd person views, with the game interface indicating information of character health, ammo count, armor, etc. (Pinelle et al. 2008). Shooter game titles like *Call of Duty* are quick-paced, dependent on hand-eye coordination and accuracy, as opposed to strategy games like *Civilization*, which requires strategic planning and management of resources to accomplish a winning outcome.

Simulations are designed to be experienced in a more open and exploratory manner, with no definitive win or lose outcome often contained in games. Grounded towards reality, simulations are a *"representation of a real environment*" (Sutcliffe 2002:2). For example, in *Microsoft Flight*

Simulator, players are situated in realistic cockpits and control the launch, flight and landing of planes. Real weather data could be downloaded to simulate live weather conditions and the geography is in sync with the player's geographical location. The integration of real-world data essentially adds a layer of authenticity and believability into the simulation experience. Unlike games, feedback in simulations is often not instantaneous, but rather intentionally delayed or presented in debriefing sessions (de Freitas and Maharg 2011).

The term "role-play" could be distinguished in two contexts - the *act* of role-play, or role-play as a *game genre*. The act of role-play refers to the pretend-play of characters, be it predetermined characters or player-customised avatars. Sutcliffe (2002) regarded role-play as the instance when players are assigned roles in simulations, where players act out the role based on personal interpretations, whilst adhering to rules of the simulation. Most games will also involve some form of role-play. Players could role-play as a racecar driver, emperor, paratrooper, boxer etc. The extent of role-play however, is dependent on the game's genre. For instance, in the game *FIFA*, players role-play as football players and selects a team for their character, pick a jersey number, customise their character's appearance or statistics (speed, dexterity, football handling, etc.). Beyond that, there is little involvement of the player acting and adopting the persona of a football player. The character functions as a virtual representation of the player in the gameplay, in which the goal of the game is to simply win football matches – players do not embody the personality or form emotional connections with the character in the process.

On the contrary, the act of role-play in other game genres – role-playing games in particular, enables players to adopt the character's persona. Through role-play, players make decisions on behalf of the character, develop skills, develop relationships with non-playable characters, etc., thus assuming and constructing their character's identity in the game world. Powerful emotional connections could be established with the game character through this role-playing process. This form of character attachment will be discussed further in Section 2.3.5.

Lastly, role-play in the context of *game genre* refers to role-playing games (RPGs). Typically, RPG game titles consist of similar game attributes and mechanics. For instance, the use of linear or non-linear narratives, in which players' decision will influence the story's progression or eventual outcome. As previously discussed, compared with other game genres, players are considerably more involved in the *act* of role-play in RPGs, with game mechanics ranging from simple character customisation, character growth through leveling up to decision-making, critical thinking or problem solving as the character. Further discussion on RPGs will be presented in Section 2.3.4.

2.3.2 Game-Based Learning

With diverse range of game titles released each year, the gaming industry demonstrated steady growth and popularity in recent years, enabling simultaneous participation from gamers around the globe (ESA 2015), prompting increased research interest in the use of digital games for learning purposes (Panoutsopoulos et al. 2014). The use of games initiates a shift towards a new learning paradigm, moving beyond traditional teaching and learning principles (where units of knowledge are typically presented to learners in curriculum formats), to using games as a means to simulate experiences and creating apprenticeships (de Freitas and Maharg 2011).

Games enable students to apply, practice and make mistakes, creating a safe learning environment for students as they progressively gain proficiency in knowledge and skills acquired from classroom (Gee 2004). Kiili (2005) noted that games serve as a meaningful environment for problem-based learning, allowing students to discover new ideas in the process rather than rote-memorization of learning materials. Games could also present narrative elements and plot hooks with challenges of varying difficulties, where players take action or make decisions to influence the progression and outcome of the game (Prensky 2007; Panoutsopoulos et al. 2014). In contrast with traditional medium (books, films) where readers/viewers act as passive audience of the narrative, active participation enabled in game narratives presents players with an added level of immersion during the game play experience.

2.3.3 Traditional Role-Play

The practice of role-play stemmed from a long history of usage across a diverse range of fields, such as drama, psychotherapy, entertainment, education and training. A broad definition of role-play can be described as follows:

"In a role-play, the participants take on a "role" in a specific situation or scenario. They can play their own part or someone else's in a safe environment where they can act, experiment, learn and teach without risking irreversible consequences." (Ladousee 1987: 539)

Some forms of role-play were based on drama techniques (Mcsharry and Jones 2000), in which spontaneous portrayals of emotions and thoughts are often encouraged (Shearer and Davidhizar 2003). Players act out their roles with the use of scripts – either verbatim or partially scripted, which provide occasional cues during the role-play (Nestel and Thierney 2007). Viewing role-playing from a historical perspective, its early formal use can be traced back to the field of psychotherapy. Psychiatrist Jacob Moreno first introduced role-playing as a treatment methodology in group therapy sessions during the 1920s, where patients sought to attain insights of emotional issues through the reenactment of past events. The role-playing activity is engaged within a social group setting, with the involvement of a patient acting as the protagonist, a therapist as the mediator and a group of audience providing additional support throughout the session.

Another early use of role-play was as an evaluative tool in the military to determine an individual's response and reaction when confronted with hypothetical situations. As a strategic effort to improve officer units, the German high command used role-playing to identify effective leaders with caliber (Blatner 1996). Of a similar example, Aronson and Carlsmith's (1968) "*Role-Playing Study*" described how participants simulate behaviors whilst imagining themselves as characters confronted with a situation, shedding an interesting insight on how role-playing activities were not

considered as a form of entertainment in the past, but rather, a didactic approach used by educators to motivate learning (Naidu et al. 2009). Such uses of role-play are notable as it challenges society's pre-conceived notions that one's ability and expertise in a subject area should be based solely upon academic merits. Through the use of role-play, skills and knowledge are put to the test at a practical level, thus assessing how individuals demonstrate their use of acquired skills and knowledge to resolve problems set within hypothetical scenarios.

These early examples of role-playing set a strong precedent for its practices across different contexts today. For instance, as previously mentioned about its use in psychotherapy - rather than an individualistic experience, the role-playing session is engaged within a social group setting, necessitating direct or indirect interactions from other participating members within the group. The "*warmup period*" and post-session discussions of psychotherapy role-play is indicative on how a role-playing experience extends beyond the mere acting or reenactment of an event. These pre and post-session conversations afford participants the opportunity to critically reflect upon their overall experience whilst seeking feedback from their peers - an imperative factor in achieving a role-playing experience that is conducive to accomplishing desirable outcomes.

These uses of face-to-face role-playing activities as an evaluative tool would later be translated into the field of education, in which educators use role-play as a classroom activity to not only assess students' practical knowledge proficiency - but also as a pedagogical tool to attain desirable learning outcomes. Beard et al. (1995: 133) wrote of the typical process of face-to-face role-playing exercise in classrooms settings:

"In a role-play exercise, participants are given a description of a scenario and their role in that scenario. They are then asked to assume they are in that situation and to respond to both the situation itself and to the actions of other role-players. Following the role-play, a guided discussion focuses attention on what happened during the role-play and provides performance

feedback. This simulated interaction gives participants an opportunity to practice and receive feedback on important behaviors within the classroom."

With teachers acting as facilitator, role-playing creates a safe environment for students to express and form strong opinions. Students are placed in situations where decisions are made, exposed and challenged, thus expanding participants' own views and belief systems (Brown 1994). Role-plays have been used as classrooms learning activity for a variety of purposes. Foreign language classrooms for example have used role-playing as a teaching instrument to improve communication methods and approaches, where language textbooks often contain scenarios and dialogues that encourages learners to act and speak using the newly learned in face-to-face situations within the classroom environment (Ludewig and Ludewig-Rohwer 2013).

Within classrooms, scenarios in role-play could also be used to engage students in critical thinking, ethical considerations and problem solving during the decision-making process of difficult situations. Brown's (1994) *New Zealand* role-play exposed finance management students to a realistic scenario that illustrated finance principles and ethical considerations, in which students analysed the situation through perspectives of different stakeholders before finalising their decisions and resolving the conflict. In journalism education, educators used role-playing to simulate ethically difficult situations, where students need to make quick decisions as spontaneous events unfold (Bowman 2011). Role-playing activities could also be practice oriented. Beard et al. (1995) described the use of role-playing as a low-cost simulation to train aviation aircrews and support staff. Through target practice and behavioural feedback, participants practiced crew resource management skills by interacting and coordinating crew responses in situations.

Although role-playing in classrooms yields several educational benefits, there are also limitations, along with considerations that should be made to encourage participation of this activity in class. Ludewig and Ludewig-Rohwer (2013) described that using role-playing as a classroom activity

benefits personality types that are more extroverted, whilst the introverted learners that are less outgoing by nature will find the experience stressful and unpleasant (Hortwitz et al. 1986). Another limitation of role-playing is the tendency of this activity to be advantageous towards students with a higher level of proficiency in the related knowledge or subject area. Students with a weaker level of knowledge or skill may require more time to understand, reflect and respond towards the situations presented to them during role-play. Being required to confidently and spontaneously respond in front of class could potentially be damaging towards students' self-confidence, thus backfiring on one of the key goals of role-playing – to create a safe learning environment for learners (Ludewig and Ludewig-Rohwer 2013). The richness of scenarios also plays an important role in the role-playing experience (Brown 1994). Scenarios need to be well constructed with relevant reference points that students could relate with their own experiences. Elements of conflicts could also be included and the scenarios should appeal to students' imaginations and humor for more enthusiastic participation in the role-playing activity.

2.3.4 Defining RPGs

The advancement of the gaming industry in recent years prompted the progressive rise of role-playing games (RPG) as a popular game genre. The 2013 Entertainment Software Association (ESA) Sales, Demographic and Usage Data reported that RPGs formed the largest cohort (28%) of best selling computer game genre in 2012 in comparison with genres such as casual games, action/adventure games, sports games, strategy games etc. In the case of MMOGs (Massive Multiplayer Online Games) for example, MMORPGs (Massive Multiplayer Online Role Playing Games) are deemed the most common, accounting for 98% of the entire market share (Woodcock 2008).

Past literatures have sought to define role-playing and identify the key characteristics that are representative of role-playing as a play activity. Taking a broad view of analyzing different types of live and digital role-playing, such as live action, tabletop or online role-play - Montola (2007: 178) defined role-playing as "…*an interactive process of defining and re-defining an imaginary*

game world, done by a group of participants according to a recognized structure of power. One or more participants are players, who portray anthropomorphic characters that delimit the player's power to define."

Montola (2007) concluded that central to the process of role-playing are three defining key elements. The first is the how role-playing requires players to engage in the process of interacting and defining the fantasy game world, based upon their own intuitive understanding on what this world would be like. This can be accomplished through various means – in the case of LARPs for example, it can be engaged through the use of speech, whilst for online RPGs, its channel of communication could be through the virtual environment of the game itself.

The second key element of role-play is based upon the hierarchical structure that is defined. Whether it is tabletop RPGs, LARPS or digital RPGs - there is often some power or rule-sets that are allocated and defined, which serves to establish an understanding on abilities and limitations of each player as they employ imaginary techniques to interact within the game world. Lastly, the third defining element of role-play is the "*anthropomorphic characters"* portrayal by players. Players typically engage control in *"actions, emotions and thoughts of their character*" (Montola 2007), projecting human-likeness in the persona of anthropomorphic characters.

Of a different approach, some researchers defined RPGs based primarily upon the specifics of its embedded game mechanics. Tychsen et al. (2006: 254-255) reported key characteristics which highlights the formal structure of contemporary RPGs:

"1. The core of the game is role playing guided by rules. Each player takes control of one or more (although typically only one) character. A character is a fictional figure that the player tries to act (as role play).

2. The player will usually have full control of decision making at the character level. There is no

author-audience relationship: each player has a hand in developing a personal, perceived story.

3. The game is usually set in a fictional reality, which is communicated via the fictional contract. The contract is the shared understanding among the game participants of the game setting/world.

4. With very few exceptions, the games are supervised or guided by a Game Master (GM), who assumes a variety of responsibilities depending on game type and style of play, notably, (a) facilitation of game flow, (b) environmental content, (c) administration of rules, and (d) engagement/entertainment.

5. At least two participants are required. In general, noting the above exception, these will be a player and a GM. Typically, these roles are fixed, although in some games, the roles are interchangeable. The players and GMs together are the participants of the game."

Greco (2009) noted that point 4 and 5 quoted above might not necessarily apply to majority of computer RPGs, which often doesn't require a Game Master and could be played simply with a single player. Montola (2007) and Tychsen et al's (2006) definitions of what constitutes as role-play indicated some amount of overlaps and notable characteristics. Core to role-play is the process of players portraying the personas of fantasy characters. Within the scope of game-defined rule-sets and limitations, players assert various levels of control on the character to interact and redefine the fictional game world. The second characteristic of RPGs is its narrative element. Whether it is tabletop RPGs, LARPs or digital role-play – the narrative element is often a core part of the game. In many instances, through role-play, players have some level of control as the story unfolds throughout the game. For example, making decisions for a character, which may change the outcome of the story. Lastly, is the social interaction within RPGs. RPG gameplay is often a group experience – as such, active player-to-player communication is essential for an effective role-playing experience.

2.3.5 Character role-play

Within an RPG environment, players assume the role and control of one or more fictional characters (Tyschsen et al. 2006; Naidu et al. 2009). As a character accomplishes in-game goals and tasks, experience points (commonly known as "xp") are collected, thus enabling incremental character growth as the game progresses. Such mechanics of character growth and experience points are distinguishing characteristics of RPGs in comparison with games of other genres (Barton, 2008 cited in Williams et al 2011). Referring to Yee's (2006) study on players motivation for engaging in MMORPGs, Smahel et al (2008) described that one of the motivators for players of games in this genre is the ability to advance their game characters (by means of increasing character levels), further noting that younger male players in particular are motivated by "*power and symbols of success"* of their game characters.

Williams et al. (2011) maintained that RPGs players perceive and interact within the game world through the perspective of their controlled virtual character. Players embody depictions of themselves and form strong connections with their characters, often retaining the same character for an extended length of time (Bessière et al. 2007). Character creation is often an embedded feature in most RPGs, where players would define the identity of their characters, such as race, class and name – many of which are fixed attributes that would later determine the character's physical appearance, attire, skills and progression over time (Fron et al, 2007). Bessière et al. (2007: 531) argued that the character-creation feature enables players the ability of creating characters which projects physical and psychological aspects that they aspire for themselves in their "*ideal self*", adding that this process of character creation is further encouraged as audience or collaborators "*by the fact that player has an audience and collaborators who have no prior knowledge of the player or his real-life situation.*" This view of players creating fantasy personas of themselves is consistent with Taylor's (2003: 26) discussion on the topic of dress-up play in games:

"MMORPGs give the user (in varying degrees) an opportunity to engage in various identity

performances and corresponding forms of play. Both because of the explicit nature of the space (role play) and the engagement with avatars, users can construct identities which may or may not correlate to their offline persona… Through the early decisions players make about their race and class they begin to fashion of themselves unique identities in the gamespace."

Yet, the player-character connection via RPG gameplay goes beyond the mechanics of making superficial changes to the character, such as physical attributes, costume selection, occupation, race, etc. At a deeper level, role-play is a form of mimicry or acting, where players adopt a different persona, momentarily suspending their own personalities and identity (Caillois and Barash 1961). Past literature have sought to address complex emotional connections and attachments RPG players experience with their game characters. Lewis et al (2008) maintained that key to an RPG gameplay experience is its immersive nature of allowing players to engage within the game world and playing the persona of their characters – a phenomenon referred as "character attachment". Based off theories on audience-character interaction, Lewis et al (2008: 516) defined character attachment as "*(a) friendship and (b) identification with a video game character when an individual (c) is willing to suspend disbelief, (d) feels responsible for the game character, and (e) feels in control of the game character's actions.*" Character attachment particularly applies to RPGs, given its distinct features which places heavy focus on character growth and narratives (May 1994, Lucas and Sherry 2004 cited in Bowman et al. 2012).

Character attachment relates strongly with past literature addressing how audiences could develop powerful emotional connections with fictional characters through traditional and digital media. Smahel et al. (2008) described how a player's relationship with a game character is akin to a relationship with absent people in real life - whilst the game character is similarly absent and exudes an "unreal" sense of feeling, they stressed that players' feelings towards the character is essentially genuine. This point of view is often linked with studies of the Parasocial Interaction Theory (PSI), which describes how intimate emotional connections are established when audiences are exposed to fictitious characters, developing a unique sense of identification and

fantasization of being a different person (Lewis et al, 2008). However, Bowman et al. (2012) stressed that this conceptualization of PSI has shifted, as variations between players and characters are not as prominent in video game environments.

Drawing comparisons with traditional media such as televisions or movies, Jin and Park (2009) argued that new media such as video/computer games or virtual reality technologies elevates parasocial relationship to a different level, enabling users to not only see visual representations of themselves in the form of animated avatars, but also actively engage and interact within the media environment, thus forming "*a parasocial relationship with their own avatars*". As such, in interactive media environments, the interaction which users experience with virtual characters forms a distinctly different parasocial relationship (Jin and Park 2009). Lewis et al. (2008: 151) explained:

"In interactive video games, there is no parasocial interaction with a fictitious character, no felt connection per se, but an actual, tangible connection between the gamer and a fully functional completely controllable avatar."

However, the emotional attachment of a player towards a game character may not always bring upon positive feeling or satisfaction. An exceedingly powerful character attachment and identification is at times attributed towards game addiction. Smahel et al. (2008: 717) wrote:

"A greater emotional engagement then seems to suggest that the player is "stuck" in the game and that it could be a reality replacement for the player. The attachment of a player to his character, even though originally created as a source of fun and satisfaction, can later become unpleasant, for example, if the character is attacked by other players."

Bowman et al. (2012: 2) described that the video game experience extends beyond character

identification and emotional connection, as players are stimulated to present themselves within the game world using their characters as virtual mediators:

"…video game play can be understood in terms of "melding of minds" between the player and the character, either through a player growing closer to an established character over time or through a player creating a unique character as an expression of self to enter the game world."

2.3.6 Narrative

The character attachment and emotional connections experienced as RPG players assume the roles of their avatars is further reinforced as narrative comes into play in the gameplay experience. The narrative structure could be presented to players through scenarios, backstories, texts or cut-scenes (Burn 2014), in which players could act upon the story in the game through their avatars, influencing the progression or outcome of the narrative. This form of control in RPG presents players with the opportunity to assess and understand the repercussions of their actions and decisions from a strategic and emotional point of view (Bowman 2011).

Although game narratives share similar characteristics as narratives in literature and films, Burn (2014) described that the narrative – through "*character roles, events and consequences, and the temporal unfolding of narrative complications and* resolutions", progressively unfolds by means of integration with the mechanics of the game, such as point systems, missions, level ups, win and lose outcomes. Unlike linear narratives such as storybooks where reader participation is passive, RPG players actively engage in exploring, problem solving and investigating during the game play experience (de Freitas and Maharg 2011). Depending on the genre of the game (RPGs, strategy games, adventure, first person shooters) - the experience of narrative in games come in different forms, ranging from a simple backstory for first person shooters, scenarios that require split-second decision making, or elaborate plots with backstories and characters with depth. Such elements contribute to the narrative play within games in different ways (Salen and Zimmerman 2004).

According to Salen and Zimmerman (2004), game narratives could be categorised as "*embedded*" or "*emergent*" narratives. Elements of embedded narrative bears similarity with linear media (films, books), where the embedded narrative content presented to players is essentially fixed. This predetermined narrative content is primarily intended to situate the players in the context of a story, thus justifying and driving motivations towards the actions and events in the game world in a meaningful manner. An example of game with embedded narrative is *That Dragon, Cancer* – an adventure game released in 2016, which retells the true story about Joel Green's 4-year cancer battle and his eventual death. On the surface, the graphics fidelity and overall gameplay is fairly simplistic. Players engage in point and click interactions and mini games whilst exploring the game world.

Figure 3 - Screenshot from *That Dragon, Cancer (2016)*

However, the core element of the gameplay experience was the narrative. The main story arc was predetermined and presented in a linear manner. Players are drawn into the story as an observer (rather than an active participant that would influence the story's outcome) of the struggles the Green family faced throughout Joel's fight against cancer. At times, the game

switches from 3rd person perspective to 1st person perspective, allowing players to momentarily role-play as Joel's parents, further increasing the emotional connection and evoking a strong feeling of empathy towards the specific game character or the story as a whole. What entails is an immersive experience where players relates and feels the range of emotions felt by the family throughout their ordeal – feelings of sorrow, anger, anguish, hopefulness, despair, grief. This game is a good example of how embedded narrative elements - even with a predetermined story arc, could be used as a powerful tool to create an immersive and meaningful game play experience.

Another form of game narrative is *emergent* narrative, where the narrative elements unfold as player progresses through the game. Decisions and interaction by players will have influence towards the narrative experience and eventual outcome (Salen and Zimmerman 2004). An example of emergent narrative could be illustrated through the game *Global Conflicts – Palestine* (2007), where players role-play as a freelance journalist on a work assignment in Jerusalem. Throughout the game, players interact and build trust with non-playable characters (NPC), taking different approaches to collect information about the conflict. The tone of conversations with NPCs changes dynamically, depending on player responses.

Figure 4 Screenshot from *Global Conflicts - Palestine* (2007)

Using the collected materials, players will create a story for the newspaper, making decisions on which materials to print – in which the choice of materials selected for publication will affect player's standings with different sides of the community. Through emergent narrative, players gain knowledge about the Palestine conflict by being situated in the game world, ethical views are also being challenged as the story unfolds. In this example, players' conversations with NPCs, actions and decisions influence the flow and outcome of the game.

In the context of education, game narratives is essential in learning environments, as it provokes thinking and enable players to create meaningful experiences through guided actions (de Freitas and Maharg 2011). Cut-scenes for instance could effectively be used in games. Khine (2011:60) noted, "*…cutscenes may also serve as an effective technique for facilitating fundamental instructional events, such as, but not limited to (a) gaining learners' attention, (b) informing learners of targeted objectives, (c) stimulating recall of prior knowledge, and (d) providing learning guidance"*. The elements of narratives and cut-scenes will be revisited and taken into consideration when developing digital RPG in the later stage of this study.

2.4 Methods of Data Collection and Serious Games Evaluation Methods

Before considering research methodology of this study (Chapter 3), it is imperative to review existing methods of data collection and evaluation methods. As the primary aim of this study is to investigate the effectiveness of using digital RPGs in classrooms to achieve learning outcomes, the methodology will be inclusive of an evaluation process of a digital game. Games could be categorised through its primary function – whether for entertainment or learning (Connolly et al. 2012). Serious games in particular is a category of games which aims to increase learning and affect behavioural change to the player, typically used in training for education, business, healthcare, industry, marketing, etc. (Sawyer & Smith 2008). In this study, the game to be

evaluated is a digital RPG (a game of the *role-playing* genre), where students could role-play as design practitioners and complete real-world tasks within a simulated workplace environment. As the digital RPG will be embedded with instructional objectives of aiding digital media students in achieving desirable learning outcomes, this digital RPG falls into the serious games category. As such, data collection and serious game evaluation methods used in similar studies were considered.

The use of different methods for data collection such as interviews, observations and content analysis would demonstrate that a study was rigorously investigated at different angles and perspectives (Maykut and Morehouse 1994). Involving data collection from different sources that would enable a researcher to draw comparisons between different stakeholder groups, essentially identifying "…*areas of agreement as well as areas of divergence*" (Guion et al. 2011). Such a process creates a valid narrative account, as it draws upon findings in different forms of evidence and data points (instead of singular event or data point), thus adding to the credibility of the research findings (Creswell and Miller 2000). Based on comparison of data collection methods of 30 game cases, Mayer et al. (2014) concluded that games were primarily evaluated through mixed-methods by means of converging pre-game and post-game player surveys, live/video observations, transcripts of post-game feedback and game results. Figure 5 presents common data gathering methods for serious games and games-based learning research:

Figure 5 - Data gathering methods for serious games and games-based learning research (Mayer et al. 2014)

Serious game evaluation methods were considered to identify feasible methods that are applicable to the research needs and contexts of this study. Baalsrud Hauge et al. (2013) presented Woolfson's (2011) hierarchy of educational intervention evaluation methods:

- Meta-analyses
- Randomised controlled trials
- Quasi-experimental designs
- Single case experimental designs – pre & post test

- Non experimental designs – surveys, correlational, qualitative

At the top of the hierarchy is meta-analyses, an approach that identifies consistent themes through analysing research findings from previous related studies. Within the field of serious games research however, there is a lack of empirical studies currently available for researchers to adequately draw from comparisons using the meta-analysis approach (Baalsrud Hauge et al. 2013). Randomised controlled trials is also high in the hierarchy, though randomised control groups is at times difficult to implement in practice, in addition to ethical concerns (Baalsrud Hauge et al. 2013). In conditions where randomised controlled trials are not feasible, quasi-experimental designs have been used as an alternative (Robson 2002). Quasi-experiments may comprise of single or multiple groups, post-test only, or a combination of pre-test and post-test designs.

While there has been an increased number of publications, research methods, instruments and findings in serious games research, Mayer et al. (2014) observed that the field of serious games lacked an encompassing methodology. Table 1 (Baalsrud Hauge et al. 2013; Mayer et al. 2014) provides an overview of different serious games evaluation methods dissected into pre-game, in game and post-game phases. The table indicates 3 forms of qualitative and quantitative evaluation – self-reporting by the participants, tested and observed by the researcher. Each method comprises of different data instruments, which in turn acquires different types of findings, ranging from dimensions such as learning satisfaction, biophysical-psychological responses and player personality or experience.

Table 1 - "What to measure, how and when" - Baalsrud Hauge et al (2013), Mayer et al (2014)

Chapter 3 will elaborate on the qualitative and quantitative evaluation methods and data instruments that will be employed to evaluate the learning effectiveness of the digital RPG used in this study.

2.5 Summary

This chapter presented a review of literature on the overarching topics that is relevant to the aim of this study:

- Pursuing "performativity" and bridging the disconnect between academia and industry.
- Learning paradigm – from didactic teaching to deep and meaningful learning.
- Defining RPGs – a look into traditional role-play, character role-play and narratives.
- Serious games evaluation methods.

It is important to stress that it is not the objective of this study to seek a substitute for traditional pedagogical approaches, but rather, the intention is to explore tools and approaches that could potentially add to the arsenal of existing educational possibilities. The world continues to radically change as major developments and global trends continue to shape the future of higher education, thus it is imperative to momentarily step away from traditional views of teaching and learning and examine through a different perspective to seek alternative approaches that could potentially increase the efficacy of learning within the context higher education with universal access. It is also vital to revise pedagogical practices and ensure students' higher education experience is a process of knowledge acquisition that is meaningful, robust and relevant, which can be proficiently and concretely harnessed within a real-world context of modern society.

3 Research Methodology

3.1 Introduction

To reiterate Section 1.6, this research will consist of 4 phases, which will be discussed in subsequent chapters with further detail:

Phase 1: Study 1 (3 months) – Conduct semi-structured interviews with digital media lecturers.

Phase 2: Game Development (6 months) – Development of a conceptual framework for digital RPG game and learning design. Using this conceptual framework, a 3d digital RPG will be designed and developed.

Phase 3: **Study 2** (4 months) – The developed game from Phase 2 will be play-tested in classrooms by undergraduate digital media students at two campuses (Vietnam and Australia).

Phase 4: **Study 3** (3 months) - Digital media lecturers will play-test the game and provide feedback on learning effectiveness and feasibility of using digital RPGs as a teaching and learning tool.

Chapter 3 will present components of the methodology that will be used in the overall study. The research method, study design and data instruments implemented will be described. The chapter begins with a background information about the Digital Media bachelor's degree program, the 2 courses selected – Design for Digital Media 1 (DDM1) and Design for Digital Media 2 (DDM2), and how both courses will be used as case studies to create a generalised framework that could be replicated for similar undergraduate level courses to use digital RPGs to improve accomplish learning outcomes. This is followed with Section 3.3, which reiterates the formulated research questions and describes the overview of data collection methods and data instruments used in

this study. Section 3.4 presents the 3 studies that will be conducted sequentially in this research to answer designated research questions. Specifics on each study, such as the design of research instruments, data collection methods and sample selection methods will be described in detail. The chapter concludes with a discussion on validity, reliability and ethical considerations made in the research design.

3.2 Context of Research

The research design is dependent on aims, research questions, as well as setting and context of research. This section will establish the overall setting and context of research by providing an overview about the Bachelor of Design (Digital Media) program and the 2 digital media courses selected for this study. Participant information (lecturers and students) will also be described.

3.2.1 Bachelor of Design (Digital Media) Program

This study is conducted on lecturers and students of the Bachelor of Design – Digital Media program at a transnational university based in Australia. In this 3 years undergraduate program, students acquire knowledge on digital media design theory and practice, learning skills from core disciplines in the field, such as visual effects, interactive media, compositing, motion graphics, sound design and animation. The data collection of this study is conducted at two campuses – one in Melbourne, Australia; the other in Ho Chi Minh city, Vietnam.

All courses of the Digital Media program are moderated between course coordinators and lecturers from both campuses in Melbourne and Ho Chi Minh City, ensuring consistency of curriculum and the teaching delivery of courses. Grades are cross-moderated at the end of each semester between academic staff from both campuses to ensure balanced grade distributions in all courses. Lecturers of both campuses actively engage in conversations to discuss measures of improving course quality and students satisfaction. These efforts are in place to align with the

university's aim to offer global student mobility, giving students the opportunity to transfer between campuses for short-term studies.

3.2.2 Digital Media Courses

Two digital media courses - Design for Digital Media 1 (DDM1) and Design for Digital Media 2 (DDM2), will be used in this study to examine on how digital RPGs could be used to help students achieve desirable learning outcomes of digital media courses. Both DDM1 and DDM2 are first year courses of the Bachelor of Design (Digital Media) program. The rationale of selecting these two courses was primarily due to its learning content, which aligns well with the purpose of this study. Both courses introduce a broad base of foundational design theories, which require students to learn and understand a fair amount of theoretical knowledge and proficiently apply the knowledge into the practice of design. Given the nature of both courses, which contain a fairly equal amount of theoretical and practical learning content - DDM 1 and DDM 2 are ideal courses to create a generalised framework that can be used as a future reference for similar undergraduate level courses which may wish to use digital RPGs to increase cognitive benefits. Both courses are progressive. DDM 1 is a pre-requisite course for DDM 2. As DDM 1 students are first semester design students, they have no prior knowledge or experience in design theories and practice. The next sections describe DDM 1 and DDM 2 in further detail.

3.2.2.1 Design for Digital Media 1 (DDM 1)

Design for Digital Media 1 (DDM 1) is a first year, first semester course in the Digital Media degree program's pathway. Enrolees of this course are new undergraduate students beginning their first semester in the university, with no prior knowledge or experience in the theories and practice of design, as well as minimal technical skills in design software. This course is essentially a foundational course with 24 credit points, which offers an introduction of contemporary digital design. Throughout the span of 12 weeks, students are introduced to theories of design. Students

will also develop creative responses, learn about production processes and subsequently apply acquired theoretical knowledge into practical design projects in traditional and digital formats.

3.2.2.2 Design for Digital Media 2 (DDM 2)

Design for Digital Media 2 (DDM 2) is a first year, second semester course, which follows after DDM 1. As DDM 1 is a pre-requisite for this course, all students in DDM 2 have spent one semester acquiring foundational knowledge of design and have some prior experience in design practice through the execution of design projects. This course is a continuation of DDM 1 and introduces new design theories to further develop students' creative skills and design concepts toward the development of digital media content, in which students explore the process of design and examine its relationship towards conceptual and practical development of digital media. Similar with DDM 1, this course is worth 24 credit points.

3.2.3 Participants

The insights of both lecturers and students will be acquired during the data collection process to attain findings from both the educators and learners' perspectives. The data collection will involve participation of lecturers and students of the Bachelor of Design (Digital Media) program, from both Vietnam and Australia campuses of the university.

All lecturers participating are involved in teaching first year to third year courses in the Digital Media program with a diverse range of specialisations, such as video production, digital compositing, art history, interactive media, sound design, visual design and 3d animation. All lecturers interviewed are digital media practitioners and have extensive years of teaching experience in higher education and industry experience in the field of digital media. Participant characteristics will be elaborated with further details in Chapter 4.

Student participants in this study are first year undergraduates in the Bachelor of Design (Digital Media) program. As this cohort of students has commenced their studies within a period of less than a year, they have limited theoretical and practical knowledge in the field of design. The student participants have basic computing skills and meet the same English requirements for entrance into the degree program. The student sample used in this study will comprise of three cohorts – Design for Digital Media 1 (Vietnam campus), Design for Digital Media 2 (Vietnam campus) and Design for Digital Media 2 (Australia campus). Participant characteristics will be elaborated with further details in Chapter 6.

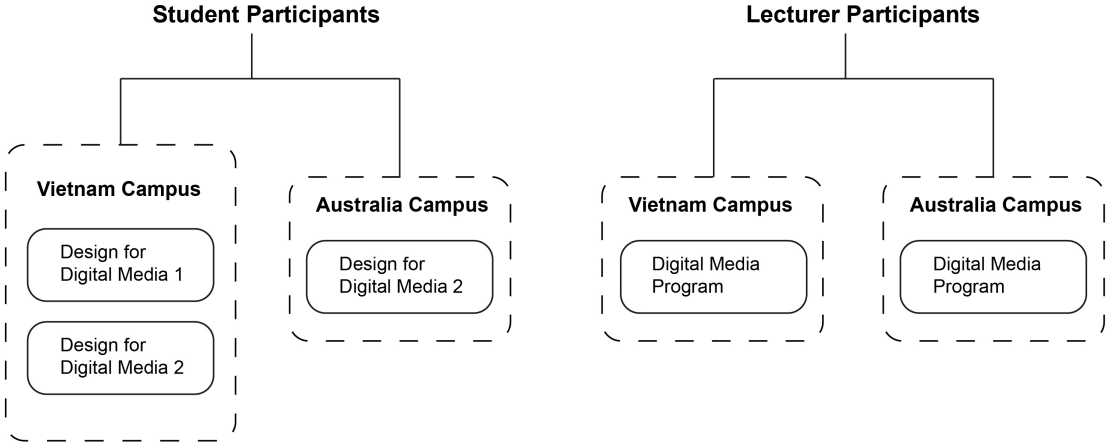

Figure 6 - Participation of students (DDM1 and DDM2) and lecturers of the Digital Media program from Vietnam and Australian campuses.

3.3 Research Design

3.3.1 Research Questions Revisited

Table 2 reiterates the formulated primary and secondary research questions:

Primary Research Question	**Could digital RPGs be implemented in classrooms as an effective learning tool for students to accomplish learning outcomes of digital media courses?**
Secondary Research Question 1	**What features or elements of digital RPGs could be used for students to accomplish learning outcomes and overcome learning challenges in digital media courses?**
Secondary Research Question 2	**Which types of learning outcomes in digital media courses could best be supported through digital RPGs?**

Table 2 - Formulated Research Questions of this Study

It is imperative to determine what types of questions could best be answered by which types of methods to determine appropriate research approaches (Fraenkel et al. 1993). In doing so, each research question was further dissected into sub-questions to pinpoint specific areas that would be valuable in investigating each research question. Identifying these areas of focus will ensure that informed decisions are made when determining appropriate study designs, data types, data collection and data analysis methods to gather pertinent findings for each research question.

Sections 3.3.1 will present sub-questions for each formulated research question.

Primary Research Question

Could digital RPGs be implemented in classrooms as an effective learning tool for students to accomplish learning outcomes of digital media courses?

S1: Did digital media students experience a performance gain in theoretical and practical design knowledge after using digital RPG as a learning tool?

S2: Did students find that the use of digital RPG as a learning tool was effective in helping them overcome existing learning challenges faced when studying digital media courses?

S3: What are students' opinions about the feasibility of using digital RPGs as learning tools for digital media courses?

S4: What are the opinions of lecturers about the feasibility of using digital RPGs as teaching and learning tools in classrooms to improve students' theoretical and practical design knowledge?

Secondary Research Question 1

What features or elements of digital RPGs could be used for students to accomplish desirable learning outcomes and overcome learning challenges in digital media courses?

S1.1: What learning challenges do students commonly face when studying digital media courses?

S1.2: What teaching challenges do lecturers commonly face when teaching digital media courses?

S1.3: Which features or elements in a digital RPG did students find the most useful in accomplishing learning outcomes and overcoming learning challenges?

S1.4: Which features or elements in a digital RPG did lecturers find the most useful in accomplishing learning outcomes and overcoming teaching and learning challenges?

Secondary Research Question 2

Which types of learning outcomes in digital media courses could best be supported through digital RPGs?

S2.1: What are the desirable learning outcomes of digital media courses?

S2.2: Which features in digital RPGs could best support these desirable learning outcomes?

S2.3: How could in-game tasks be designed in digital RPGs to align with learning outcomes of digital media courses?

3.3.2 Review of Research Methods

The approach to research requires philosophical assumptions, well-defined methods and procedures (Creswell 2014). This study aims to investigate the learning effectiveness of digital role-playing games for students to accomplish learning outcomes in digital media courses. A deterministic philosophy was considered for this study, with the view that objective knowledge could be acquired through experience or observation, in which the cause determines outcome of different conditions. Post-positivism *"…represents the thinking after positivism, challenging the traditional notion of absolute truth and knowledge (Philips & Burbules, 2000) and recognising that*

we cannot be positive about our claims of knowledge when studying the behavior and actions of humans." (Creswell 2014). An altered form of scientific method adapted for social sciences (Taylor and Medina 2003; Robson 2002), the post-positivist paradigm enables increased interaction between researcher and participants (Willis 2007). While quantitative methods such as survey research are predominantly used, qualitative methods such as interviewing or observations could also be used within this paradigm (Mertens 2010; Creswell 2008). Essentially, post-positivist research seeks develop and formulate statements to address cause and effect relationships. When conducted in quantitative studies, this relationship is established amongst variables and posed in the forms of questions or hypothesis (Phillips and Burbules 2000). This study will adopt the post-positivist view, taking an evidence-based approach in the research design. Detailed research procedures will be prescribed and hypotheses defined to ensure formulated research questions are precisely answered without any forms of ambiguity.

3.3.3 Research Approaches

3.3.3.1 Quantitative Approach

The quantitative approach stems from the positivist paradigm; in which designed studies are primarily experimental in nature, with emphasis on measuring and investigating causal relationships (Harwell 2011). Objectivity in quantitative research methods is key. Harwell (2011: 149) described:

"Quantitative research methods attempt to maximize objectivity, replicability, and generalizability of findings, and are typically interested in prediction. Integral to this approach is the expectation that a researcher will set aside his or her experiences, perceptions, and biases to ensure objectivity in the conduct of the study and the conclusions that are drawn."

Quantitative research is useful in obtaining and analyzing precise numerical data relatively quickly and easily. Research findings could also be easily generalized when replicated in different

populations. However, due to quantitative studies' focus on hypothesis testing (a stark difference from qualitative research, which emphasizes on hypothesis generation), researchers may overlook on occurring phenomena in the study (Johnson and Christensen 2008).

3.3.3.2 Qualitative Approach

Contrary to quantitative research, which uses fixed sets of questions in forms of questionnaires or surveys as data collection instruments; qualitative research uses a considerably flexible approach in the process questioning, where researchers may ask questions that are not part of the basic question set, in addition of additional follow-up questions (Wimmer and Dominick 2013). Key to qualitative studies is the approach of acquiring meaning and understanding in natural settings and situations (McMillan 2012). As the settings are situated and immersed within local contexts, phenomena could be captured with rich detail, enabling qualitative studies to be particularly perceptive on local contexts, situations and stakeholder needs (Johnson and Christensen 2008). Qualitative data is analysed through consistent and reliable coding of data and identifying themes. Sampling approach in qualitative research is typically "…*not random but is purposive"*, in which subjects are primarily selected based upon characteristics (Glenn 2010).

3.3.3.3 Mixed-Methods Approach

The mixed-methods approach emerged as an alternative research method from the 1970s to 1990s, shifting away from early positivist quantitative and qualitative interpretivist/constructivist paradigms of research (Johnson et al 2007; Robson 2002). Mixed-methods research theoretical and practical knowledge by considering different perspectives and viewpoints, often inclusive of both qualitative and quantitative stance in research (Johnson et al. 2007). While quantitative research primarily emphasizes on hypothesis testing, qualitative research leans towards "*hypothesis*-generating", taking an exploratory approach (Glenn 2010). Creswell (2014) described that the use of quantitative research does not sufficiently investigate and probe personal meanings, stories or individual perspectives; while qualitative data prevents researchers from

creating generalisation of a small sample to a large population. The use of mixed-methods design is beneficial when complex research questions are investigated – whilst statistical analyses of survey data could evaluate patterns in detail, qualitative data could provide in-depth meaning of survey responses (Driscoll et al 2007).

3.3.4 Rationale of Using Mixed-Methods Approach

This study will adopt a triangulated mixed-methods approach. Such inclusion of both qualitative and quantitative data provides an extensive and overarching view of the research situation, which may not be achievable with the use of only a singular type of data (Fraenkel et al. 1993). This study intends to investigate the learning effectiveness of digital RPGs as a learning tool for students to accomplish learning outcomes in digital media courses. A key consideration is determining how learning effectiveness of serious games are assessed in similar studies. In Girard et al.'s (2013) meta-analysis on studies that evaluated the learning effectiveness of serious games as educational tools, the majority of studies examined have taken a quantitative approach. As a means of measuring learning effectiveness, classical pre/post-test experimental designs were implemented to measure performance gains after students used serious games a learning tool. Girard et al. (2013) further noted that some of the studies also investigated participants' motivation, engagement and satisfaction level through the use of questionnaires. Such an approach provides an objective and reliable means of acquiring statistical data to generalise research findings, in which hypotheses about cause-and-effect relationships could be tested accordingly. However, statistical data acquired from tests or surveys alone does not adequately provide in-depth understanding of the phenomenon as a whole. It is also essential to investigate and establish meanings on issues that could not be observed or analysed by numerical data alone.

In addition to quantitative data (performance test scores, attitude surveys), this researcher is interested in eliciting rich feedback from lecturers and students, providing a detailed account on several aspects, such as learning challenges, the engagement level of the game, feasibility of

using digital RPG in classrooms - all of which attributing to their views on the learning effectiveness of digital RPG to accomplish learning outcomes. This is achieved by adding a qualitative approach into the study as a means of supplementing findings from quantitative data.

As such, in this study, quantitative methods will be used to assess the learning effectiveness of digital RPG as a learning tool. Qualitative methods will then be used in effort of understanding and explaining quantitative results with further meaning and depth. The quantitative approach will provide necessary objectivity by statistically evaluating the effectiveness of digital RPG as a learning tool in a controlled setting. Contrastingly, the qualitative approach, in the forms of interviews and focus group feedback, will acquire meaningful responses with rich details and elaboration, enabling the researcher to draw comparisons on different perspectives (lecturers and students) and interpret such responses with further depth. Such combined use of both quantitative and qualitative approaches will ensure attained research findings are explanatory and comprehensive (Johnson and Christensen 2008; Johnson et al. 2007), adding breadth and rigor to the research (Creswell and Clark 2007).

3.3.5 Methods of Data Collection

Based upon research aims, research questions and the context of this study, a mixed-methods approach has been determined as the most feasible approach in this study. As previously discussed (Section 3.3.4), the combined use of both quantitative and qualitative data will add breadth and depth to the research findings (Johnson and Christensen 2008; Johnson et al. 2007; Creswell and Clark 2007). Therefore, this study will use a triangulated mixed-methods design as basis of research design (Figure 7), where quantitative and qualitative data are simultaneously collected in search for possible links or overlaps from multiple sources to establish themes (Fraenkel et al. 1993; Creswell and Miller, 2000; Johnson et al. 2007). Multiple sources will also be used in data collection, consisting of lecturer and student participants. Combined feedback from both the educators' and learners' perspective will add further depth and meaning in research findings.

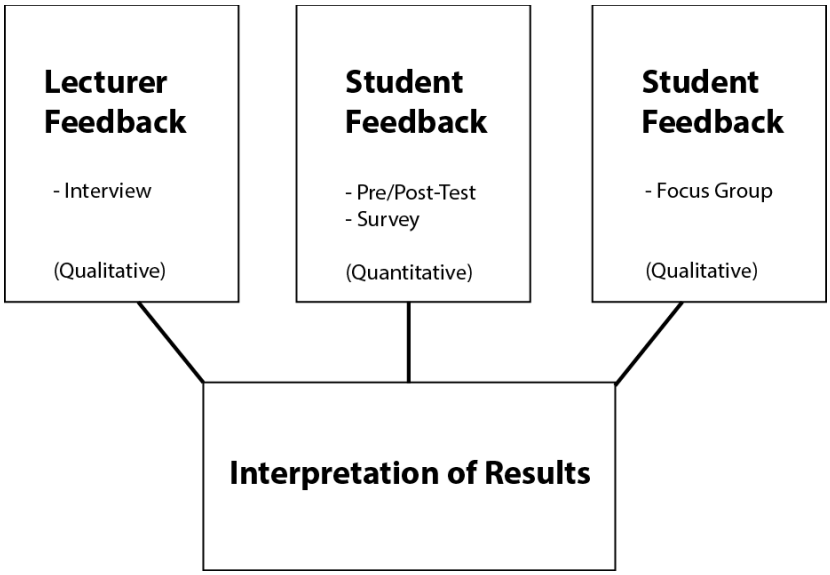

Figure 7 - Triangulated Mixed-Methods Design of this Study

Table 3 presents the data collection methods and instruments that will be implemented in this study. Combined uses of experimental (pre-test, post-test) and non-experimental (surveys, interviews, focus groups) designs will be used.

Who	Method	What	Pre-Game	Post-Game
Lecturers	Qualitative	Desirable learning outcomes, teaching challenges, learning challenges, feedback of digital RPG, feasibility of using digital RPG for teaching.	Interview	Interview
Students	Quantitative	Learning challenges, perceived learning effectiveness of *Virtual Designer*, feasibility of using digital RPG for learning.	Opinion-Based Survey	Opinion-Based Survey
Students	Qualitative	Learning challenges, perceived learning effectiveness of *Virtual Designer*, feasibility of using digital RPG for learning.	Focus Group Interview	Focus Group Interview
Students	Quantitative	Performance Test – measure performance gains from playing *Virtual Designer*.	Pre-test	Post-test

Table 3 - Data Collection Methods and Instruments of Study

3.3.6 Data Instruments

As presented in Table 3, the data instruments to be used in this study are performance tests, opinion-based surveys, interviews and focus group interviews. Data will be collected before and after participants played *Virtual Designer*. Section 3.3.6.1 – 3.3.6.4 describes the data instruments used in this study.

3.3.6.1 Semi-Structured Interview

Feedback from lecturers will be collected through semi-structured interviews in Study 1 and Study 3, with an interview guide serving as a checklist of relevant key areas as points of discussion. Interview was selected as data instrument as it enables the researcher to ask respondents to clarify or expand on essential responses (Fraenkel and Wallen 2000), which could potentially lead to interesting insights of their teaching to further inform findings of this study. Qualitative feedback gathered from semi-structured interviews with lecturers will directly inform the game design and instructional design of *Virtual Designer*.

3.3.6.2 Pre-Test and Post-Test

Questionnaires or cognitive tests are commonly used in recent studies to measure learning effectiveness of serious games as educational tools (Girard et al. 2013). This study adopts a similar approach, in which students are required to complete performance tests before and after playing a *Virtual Designer*. Through comparison of pre-test and post-test scores, learning effectiveness of the digital RPG could be quantitatively measured by calculating possible performance gains after the intervention. Students will be divided into control and treatment groups. The control group students will review design topics through a face-to-face review session with their lecturer and complete a self-review session on lesson materials. Students in the treatment group will not have face-to-face review or self-review sessions, but will instead spend 1 hour playing a digital RPG to complete scenarios and in-game tasks on design topics. All students will complete the post-test and performance gains will be measured and compared between control and treatment groups.

The pre-test and post-tests will consist of both theory and practical components. Test scores from the theory component will determine if playing *Virtual Designer* had any positive effects on students' theoretical knowledge in design. The practical component will test students' ability of successfully completing hands-on design tasks, which evaluates whether playing the *Virtual*

Designer had any effect in translating students' theoretical knowledge into performing better in real-world design tasks, in comparison to conventional learning methods. Both theory and practical test scores will inform findings on the effectiveness in digital RPG as a learning tool. The pre-test and post-test will be conducted in Study 2.

3.3.6.3 Opinion-Based Survey

In parallel with the pre and post tests, students will complete an opinion-based survey in Study 2, rating their opinions through a 5-point Likert scale. The survey will also contain 4 open-ended questions, enabling students to respond in writing with elaborated detail if necessary. The survey will be used as an instrument to provide quantitative evidence on participants' overall opinion regarding their learning experience of digital media courses, their overall experience and feedback after playing *Virtual* Designer, and feasibility of using digital RPG as a learning tool for digital media education. Numerical data could be obtained, analyzed and interpreted accordingly, in which findings will be used to complement other data collection methods used in this study.

3.3.6.4 Focus Group Interview

Students will participate in pre and post-game focus group sessions to describe their learning challenges, game-playing experience and perceived learning effectiveness of using digital RPG to increase their design knowledge and practical skills. Focus group sessions will enable the researcher to obtain rich and detailed insights from students about their opinions, attitudes and experience with much added breadth and depth, which could not be numerically quantified using quantitative methods. The focus group session will be implemented in Study 2, in parallel with pre/post-tests and opinion-based surveys.

3.4 Study Design

3 studies have been devised for this research. Utilising different data instruments to acquire data, both experimental and non-experimental designs will be implemented. Figure 8 presents a flowchart of phases in which the studies will be conducted.

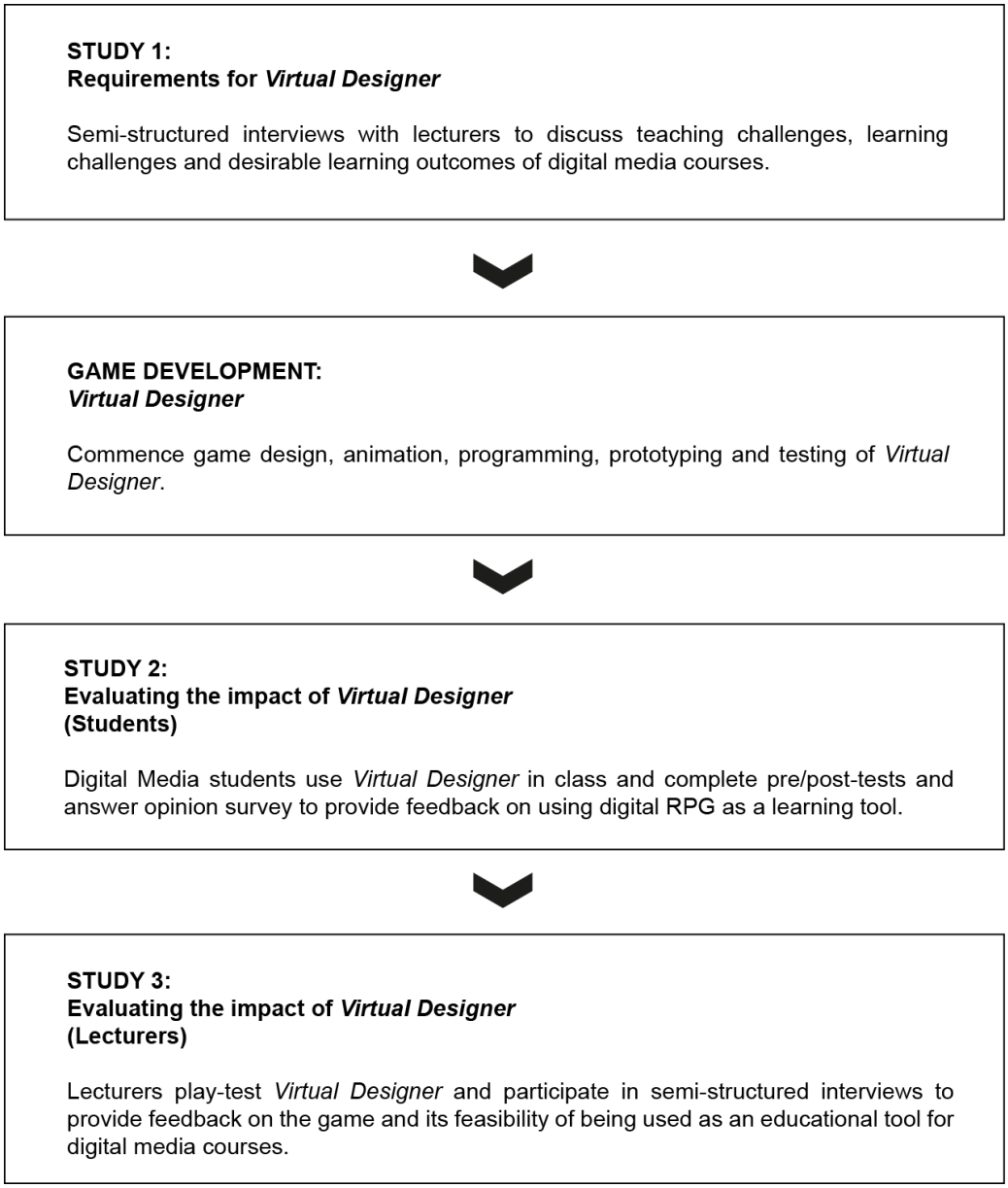

Figure 8 - Study Design Flowchart

Study	Purpose	Research Questions
Study 1 (Pre-game interview with lecturers)	Lecturers will provide input on desirable learning outcomes, teaching and learning challenges of digital media courses. Lecturers will discuss how RPG features could be used for digital media teaching and ideal methods of implementing RPG games into classroom teaching. Collected feedback from Study 1 will inform learning design of RPG game developed for this research.	**What features or elements of digital RPGs could be used for students to accomplish desirable learning outcomes and overcome learning challenges in digital media courses?** **Which types of learning outcomes in digital media courses could best be supported through digital RPGs?**
Study 2 (Pre/Post-game testing, surveys and focus group interview with students)	Students will play-test RPG game and provide feedback on the game and its' effectiveness in achieving digital media learning outcomes. Learning effectiveness of RPG game will be tested by having students complete pre/post-game tests.	**Could digital RPGs be implemented in classrooms as an effective learning tool for students to accomplish learning outcomes of digital media courses?** **Which types of learning outcomes in digital media courses could best be supported through digital RPGs?**

		What features or elements of digital RPGs could be used for students to accomplish desirable learning outcomes and overcome learning challenges in digital media courses?
Study 3 (Post-game interview with students)	Lecturers interviewed in Study 1 will play-test the RPG game. They will provide input on the learning effectiveness and usability of the game. They will discuss feasibility of using similar RPGs as a teaching and learning tool for digital media education.	**Could digital RPGs be implemented in classrooms as an effective learning tool for students to accomplish learning outcomes of digital media courses?** **Which types of learning outcomes in digital media courses could best be supported through digital RPGs?** **What features or elements of digital RPGs could be used for students to accomplish learning outcomes and overcome learning challenges in digital media courses?**

Table 4 - Studies 1, 2 and 3 - Purposes and Associated Research Questions

3.4.1 Study 1: *Virtual Designer* Requirements: Lecturers

Digital media lecturers will participate in two interview sessions in this study – one conducted before development of the digital RPG (named *Virtual Designer*) (Study 1) and one conducted after development (Study 3). Through semi-structured interviews, lecturers will provide feedback as design practitioners and subject matter experts to identify key learning outcomes of digital media courses that could feasibly be achieved through the use of digital RPGs. Collected qualitative feedback from pre-game interviews with lecturers in Study 1 will inform the game design and instructional design of the *Virtual Designer*, ensuring objectives of the game are well-aligned with educational objectives of digital media courses.

3.4.1.1 Design of Interview Guide

A semi-structured interview guide containing a set of designed questions will be used in this experiment to elicit responses from lecturers on their views in the following main areas: the desirable learning outcomes, teaching and learning challenges, and feasible digital RPG characteristics that could be used for digital media courses.

The interview guide is divided into 6 sections (Table 5). Each section contains between 3-6 questions. In reference to Patton's (1990) types of interview questions, the formulated questions in this interview guide are primarily demographic questions, experience questions and opinion-based questions. Discussion points of the interview guide will be elaborated further in Section 4.4.

Interview Guide Sections	Discussion points and Associated Research Questions
[A] Demographic Information	• Demographic questions (age, teaching experience, specialisation)
[B] Learning Outcomes	• Desirable learning outcomes of digital media courses. **Research Question S2.1:** What are the desirable learning outcomes of digital media courses?
[C] Teaching Challenges	• Teaching challenges commonly faced when teaching digital media courses. • Methods used to overcome teaching challenges. **Research Question S1.2:** What teaching challenges do lecturers commonly face when teaching digital media courses?
[D] Learning Challenges	• Learning challenges commonly faced by digital media students. **Research Question S1.1:** What learning challenges do students commonly face when studying digital media courses?
[E] Role-Playing Games	• Describe previous experience in playing digital RPGs.
[F] Digital RPGs for Digital Media Courses	• Feasibility of digital RPGs to accomplish the learning outcomes and overcome teaching and learning challenges. • Suggestions and examples on how digital RPG could be

	designed to teach digital media courses. **Research Question S1.4:** Which features or elements in digital RPGs did lecturers find the most useful in accomplishing learning outcomes and overcoming teaching and learning challenges? **Research Question S2.2:** How could in-game tasks be designed in digital RPGs to align with learning outcomes of digital media courses?
[G] Lecturers' Role in using RPGs	• Lecturers' role when students use digital RPGs for learning. • Lecturers' level of involvement during the game development process.

Table 5 - Interview Guide Overview of Study 1

3.4.1.2 Sample Selection Methods

A purposive sampling approach will be used as sample selection method to determine suitability of lecturer participants in this study that could best contribute to research findings for Study 1. As the total population of lecturers teaching in digital media program is small (19 full-time lecturers), this study will use the total population sampling technique in effort of examining the viewpoints and feedback of all lecturers that were teaching in the Digital Media program. To ensure the collected qualitative feedback is valid and applicable towards the research objectives of this study, lecturers will need to meet the 3 basic criteria to participate in this study.

The first criterion is the participating lecturer must have at minimum 3 years of teaching experience in higher education. As the interview will discuss teaching and learning challenges of digital media courses, setting a minimum teaching experience requirement will eliminate instances where qualitative feedback received on teaching challenges is attributed to the lecturer's general lack of classroom teaching experience (instead of unique teaching and learning challenges typically encountered when teaching digital media courses).

The second criterion is the lecturer must be employed full-time in the university and have taught a minimum of 1 year in the Bachelor of Design (Digital Media) program. This ensures that all participating lecturers have good familiarity and teaching experience within the digital media program. This study will exclude participation of sessional lecturers, as teaching hours for sessional lecturers are comparatively lower (between 3-6 hours per week) than full-time lecturers (12 hours per week). Restricting sampling selection to only full-time lecturers ensures that participants have sufficient experience teaching different courses and specialisation areas across the degree program.

The third criterion is all participating lecturers must be digital media practitioners. Lecturers have current or previous experience working as digital media practitioners in this industry. The areas of their specialisations in the industry could be diverse (sound design, animation, web design, graphic design, etc.). It is essential that participants of this study have practitioner knowledge in their areas of specialisation. Being practitioners, lecturers could offer their perspectives on to best approach the game design of *Virtual Designer* to accomplish formal learning outcomes whilst also providing students with a believable experience as practitioners in the game.

3.4.1.3 Data Collection and Data Analysis Method

Data collection of Study 1 will be made through semi-structured interviews, where discussions will focus on gaining lecturers' insights in 3 key areas – desirable learning outcomes, teaching and learning challenges and characteristics of digital RPGs that are feasible for digital media learning. Collected text data in Study 1 will be analysed using through the qualitative content

analysis method, in which a pilot coding and trial coding phase is conducted before finalising the coding frame. Qualitative findings will be interpreted and presented through text descriptions and data matrix. Data collection and data analysis procedures will be discussed with further detail in Sections 4.5 and 4.6.

3.4.2 Study 2 – Evaluating the Impact of *Virtual Designer*: Students

Upon the completion of *Virtual Designer*'s game development, Study 2 will be conducted to evaluate the impact of the game in digital media classroom settings. Under the supervision of lecturers, digital media students enrolled in Design for Digital Media 1 and Design for Digital Media 2 will proceed to play the game in class. Contrary to Study 1, Study 2 acquires input from the learner's point of view through qualitative and quantitative feedback of using digital RPG for digital media education. From the qualitative point of view, research focus in this study investigates pedagogical issues students encounter throughout their learning journey in digital media education, such as learning challenges within traditional classroom contexts, methods or resources commonly used to overcome learning challenges, their end-user experience in using *Virtual Designer* for learning, and perceived benefits or drawbacks of using digital RPGs for learning. From a quantitative point of view, this study intends to measure the learning effectiveness of *Virtual Designer* as a learning tool by assessing students' performance gain after using the game in class.

In arriving to comprehensive and in-depth findings to the above research questions, three data collection methods will be conducted. Students will complete pre and post-tests, an opinion-based survey and participate in a focus group interview.

3.4.2.1 Research Instruments

3.4.2.1.1 Pre-Test/Post-Tests

Students from both control and treatment groups are required to complete pre-test and post-tests. Both tests assess students on subject-matter knowledge before and after intervention.

There are 2 components in the test - the first component is a quiz, consisting of 10 multiple-choice questions. In the quiz, students are tested on their theoretical knowledge of design theory and principles that were taught through formal lectures. The second component of the test is a practical task, which requires students to complete 3 hands-on design tasks in relation to colour theory and typography. For instance, one of the tasks required students to create a colour palette based on split-complementary colour scheme. Using pre-test and post-test scores of both components, performance gains in students' theoretical knowledge and practical knowledge could be measured – and comparisons made between control and treatment groups to determine if the intervention brought upon any positive or negative effects to students' theoretical and practical performance.

3.4.2.1.2 Opinion-Based Survey

Two opinion-based survey sheets (Survey Sheet 1 and Survey Sheet 2 – see Appendix 4) will be administered before and after students played *Virtual Designer*. Students will indicate their responses through a Likert scale, which ranges between "Strongly Disagree" (1) to "Strongly Agree" (5).

Questions of the Survey Sheet 1 (pre-game) were designed to collect the following information:

1. Level of confidence – What is the level of confidence students have in different design topics, which they have learned through digital media classes?

2. Learning challenges - What are the biggest learning challenges that students commonly face when studying design? What are the measures they take to overcome these learning challenges?

Questions of the Survey Sheet 2 (post-game) were designed to collect the following information:

1. Feedback of *Virtual Designer* - Students' overall feedback on their experience of playing *Virtual Designer* from both a pedagogical and gameplay point of view.

2. **RPGs as a potential digital learning tool** – Having played a *Virtual* Designer, students' perception of whether or not digital RPGs are feasible as a digital tool to help overcome learning challenges and accomplish learning outcomes of digital media courses.

3.4.2.1.3 Focus Group Interview Guide

Two sets of questions were prepared for the focus group interviews (see Appendix 5). Set 1 questions will be presented to students before they play *Virtual Designer*, Set 2 will be presented after. Set 1 consists of 10 questions relating to students' overall opinions and views about learning challenges they have encountered when studying digital media courses and measures they take to overcome these challenges. Students will also be asked to describe their confidence level in different areas, such as their ability to transfer theoretical design knowledge into practical projects and ability to articulate about creative outputs using vocabularies of design.

Set 2 contains 8 questions, querying students about their overall experience and feedback after playing *Virtual Designer*. Students will be asked to describe if the game was engaging and if they find it to be a useful learning tool for studying digital media. On a more specific front, students will identify aspects of the game they liked the most and the least, with elaborations on the reasons behind it. Set 2 will also follow up on their responses in Set 1, in which students will be asked if *Virtual Designer* helped overcome some of the learning challenges they have identified during the pre-game interview.

3.4.2.2 Sample selection methods

Convenience sampling will be used for pre-test and post-tests, where participants are students enrolled in Design for Digital Media 1 (DDM1) and Design for Digital Media 2 (DDM2). There are by default 2 class groups per course, which will be assigned as control

and treatment groups. Prior to the start of the semester, students self-select their class groups based on individual timetable preferences. Given that the cohort of students have the same demographic characteristics and students assigned themselves into groups, it is reasonable assumption that the sample assignment into control and treatment groups are random. Statistical analysis on pre-test scores will be conducted to ensure equivalence and normal distribution between both groups. 6 students will be randomly selected from each course (DDM1 and DDM2) to participate in focus group interviews.

3.4.2.3 Data Collection Methods

In Study 2, first year digital media students will play a *Virtual Designer* in class and provide both quantitative and qualitative feedback on the overall effectiveness of the game as a learning tool for digital media courses. Three data collection methods will be used in this study – a pre-test and post-test, an opinion-based survey and pre/post-game focus group interview sessions.

3.4.2.3.1 Pre-Test/Post-Test

A pre-test post-test will be conducted on 2 digital media courses – Design for Digital Media 1 (DDM1) and Design for Digital Media 2 (DDM2). Intact class groups will be used for this experiment. Each course consists of 2 class groups and will be assigned as control and treatment groups for the experiment. The control group will experience learning using standard teaching methods (in-class exercises and lecturer review session), whilst students in the treatment group will experience learning by playing *Virtual Designer* in class. The aim of this experiment is to measure performance gain between control and treatment groups – to investigate if the use of *Virtual Designer* significantly increased students' post-test scores in comparison with control groups that used conventional teaching methods. The pre-test and post-tests will assess students' subject-matter knowledge before and after intervention.

There are 2 components in the test. The first component is a quiz, which consists of 10 multiple-choice questions. The second component is a practical task, which requires students

to complete 3 practical design tasks. Using pre and post-test scores of both components, performance gains in students' theoretical knowledge and practical knowledge could be measured, and comparisons made between treatment and control groups, to determine if the intervention brought upon any positive or negative effects to students' theoretical and practical performance.

3.4.2.3.2 Opinion-Based Survey

In parallel with pre-test and post-test, students will complete an opinion-based survey before and after playing *Virtual Designer*. With the exception of 4 open-ended questions, the survey consists of close-ended questions, in which students will rate their responses through a 5-point Likert scale. The survey will be used to measure students' attitudes and opinions of learning challenges in digital media courses in general, as well as feedback on their experience of playing the digital RPG in class, such as learning effectiveness, visual look and feel, usability, difficulties, etc.

3.4.2.3.3 Focus Group Interview

A group of students will be selected to participate in the focus group session. The aim of the focus group is to collect further qualitative feedback about students' view of learning challenges in traditional classroom settings, their overall experience playing the digital RPG and opinions about the use of digital RPGs as a learning tool for digital media education. Qualitative findings gained from the focus group could be used to verify and clarify quantitative results from the survey research, enabling a further understanding of the statistical data.

3.4.2.4 Data Analysis Methods

3.4.2.4.1 Pre-Test/Post-Tests

The experimental results consist of pre/post-test scores of both the control and experimental groups. Results will be manually entered into SPSS (Statistical Package for Social Science)

for statistical analysis to measure and compare performance gains with or without the use of digital RPG as a learning tool. Given consideration that the student sample will be measured twice in two different situations and collected data are ratio data in the form of test scores, a paired-samples *t*-test will be used for data analysis. Prior to running the paired-samples *t*-test, a boxplot will be generated to identify possible outliers in the data. A Normal Q-Q plot will be generated to inspect normality of distribution between pre-test and post-test conditions. Following that, the *t*-test will be used on the sets of data collected before and after intervention (pre/post-test scores) to determine if there are any significant statistic differences between the means of data attained from pre/post-test scores.

Further details of the pre/post-test data collection procedure will be presented in Section 6.2.1.

3.4.2.4.2 Opinion-Based Surveys

In analysing the data, the Likert items for the pre/post-game attitude surveys (Survey Sheet 1 and 2) will be coded as follows: **Strongly Disagree (1), Disagree (2), (3), Agree (4), Strongly Agree (5)**. Frequency tables will be generated for collected responses to determine the counts and percentages of each Likert-scale category. Percentages for “Agree/Strongly Agree” and “Disagree/Strongly Disagree” will be counted as combined totals to determine overall agreement/disagreement in each response. Some individual questions will be combined together as a unified set to address a specific aspect.

For open-ended questions (Questions 15, 16, 43, 44), qualitative responses will be organised through coding schemes. The frequency of each code will be calculated and presented as percentages to identify common themes that emerged from student responses. Categories will be created with defined criteria and total occurrences of responses that fall into each category will be tallied to construct frequency distribution tables.

3.4.2.4.3 Focus Group

Responses collected from the focus group were recorded and transcribed verbatim. Responses were tallied and organised according to general theme for each question to present an overview of opinions conveyed by students.

3.4.3 Study 3 – Evaluating the Impact of Virtual Designer: Lecturers

Upon the completion of *Virtual Designer's* game development, lecturers will play-test the game in Study 3. Lecturers will provide feedback on their overall experience in using *Virtual Designer* and the feasibility of using digital RPGs to achieve desirable learning outcomes of digital media courses. Although students will be involved in evaluating *Virtual Designer* in Study 2, this process involving lecturers is essential in attaining valuable insights from their perspective as educators, subject matter experts and digital media practitioners – to objectively determine if digital RPGs such as *Virtual Designer* could be used as an effective teaching and learning tool for digital media education. Study 3 aims to answer the following research questions:

Could digital RPGs be implemented in classrooms as an effective learning tool for students to accomplish learning outcomes of digital media courses?

Which types of learning outcomes in digital media courses could best be supported through digital RPGs?

What characteristics of digital RPGs could be used for students to accomplish desirable learning outcomes and overcome learning challenges in digital media courses?

3.4.3.1 Design of Interview Guide

The interview guide in Study 3 will consist of 3 sections, with between 4-6 questions per section (see Appendix 2). The 3 sections focuses on gaining lecturers' insights in 3 key areas

– feedback of *Virtual Designer*, alignment of the game with learning outcomes and feasibility of using digital RPGs as a learning tool. As the interview is semi-structured, lecturers will be probed further if necessary to elaborate on interesting points of discussions. Table 6 presents an overview on the interview guide sections of Study 3.

Interview Guide Sections	**Description**
Feedback of *Virtual Designer*	Having played *Virtual Designer*, lecturers will provide feedback on their overall experience about *Virtual Designer*.
Learning Outcomes	Lecturers discuss their opinion about the instructional design of *Virtual Designer* and whether the game objectives are adequately aligned with desirable learning outcomes of digital media courses.
Feasibility of Digital RPGs as Learning Tool	This section will contains questions relating to lecturers' views on the feasibility of using digital RPGs as a teaching and learning tool in class.

Table 6 - Interview Guide Overview of Study 3

3.4.3.2 Sample selection methods

Participants in Study 3 will be lecturers who participated in Study 1, prior to the game development of *Virtual Designer*. As such, participants will have the same characteristics based on selection criteria outlined in Section 3.4.1.2.

3.4.3.3 Data Collection Methods

Like Study 1, Study 3's data collection will be conducted through semi-structured interviews with lecturers. The interview discussions focus on gaining lecturers' insights and views in 3 key areas – feedback of *Virtual Designer*, learning outcomes and feasibility of using digital RPGs as learning tools for digital media courses.

Feedback of Virtual Designer

Having play-tested *Virtual Designer,* lecturers will first be asked to describe their overall experience of playing the game. Aspects of the game such as overall design, usability, interactivity, will be discussed. Lecturers will also be asked to identify positive and negative aspects about the game.

Learning Outcomes

The interview proceeds to discuss the instructional design. Lecturers will provide their views about the overall instructional design of in-game tasks of *Virtual Designer*. Issues such as learner feedback, level of difficulty, clarity of instructions, etc. will be discussed. Lecturers will also describe if the game objectives sufficiently meet the desirable learning outcomes of digital media courses identified and overcome common teaching and learning challenges of digital media courses.

Feasibility of digital RPGs as Learning Tool

Lecturers will be asked to provide their opinions on whether or not they *Virtual Designer* is an effective learning tool to accomplish learning outcomes for digital media courses. Lecturers will answer questions relating to the feasibility of using digital RPGs as a teaching and learning tool in class, and how they might use similar games like *Virtual Designer* for the digital media courses they teach. Lecturers will also be asked to provide further suggestions on how digital RPGs could be used in classroom setting.

3.4.4 Data Analysis Methods

Study 3 will use he same data analysis method and procedure in Study 1 (Section 3.4.1.3). A qualitative content analysis method will be implemented, in which a pilot coding and trial coding phase will be conducted before finalising the coding frame and interpreting the data.

3.5 Other Issues

3.5.1 Ensuring Validity and Reliability

Section 3.3.4 has described how triangulation is typically used as a method in studies to improve upon reliability and validity of research (Golafshani, 2003). This study will use be utilising a triangulated mixed-methods design to attain research findings. In doing so, two forms of triangulation would be implemented: data triangulation and methodological triangulation. Data triangulation refers to the use of multiple sources to provide a deeper and comprehensive understanding on a phenomenon. In this study, both the qualitative feedback of lecturers and students were attained to gain meaningful insights on the research topic. Both the educators' and learners' perspectives could be compared to identify corroborations or contradictions in the feedback. The combined data could also be used to complement quantitative findings in Study 2 (opinion-based survey) to arrive to relevant findings and conclusions.

Methodological triangulation was also conducted in this study as a means to reinforce validity of data. Rather than using a singular approach in data collection method, a mix of different methods will be used for data collection – semi-structured interviews (lecturers), focus groups (students) and opinion-based survey (students). Complementary use of collected data sets from these mix of methods will be used to reinforce validity of research findings in this study.

In terms of the design of research instrument, content validity was taken into account. The performance tests (pre-test/post-test) in Study 2 were designed to assess students' level of theoretical and practical knowledge in design. As student participants in Study 2 are first year

undergraduates with limited experience and knowledge in the field of digital media, it is imperative to ensure that students are tested on only topics that they have learned in class at an appropriate level of difficulty. In doing so, test questions were based entirely upon course materials (lecture notes, tutorial notes) presented in class. To establish content validity of both tests prior to administering it in class, lecturers of DDM1 and DDM2 reviewed the test questions, ensuring that the level of difficulty, the phrasing of questions and the range of topics covered are well aligned with students' current state of knowledge in design. The test questions underwent several iterations upon receiving feedback from lecturers before finalisation.

Measures were also taken to identify and address threats to internal validity. The first concern was ensuring the equivalence of class groups in Study 2. This primarily refers to the equivalence of academic ability between control and treatment groups, as well as equivalence between different courses (DDM1 and DDM2). Although random assignment procedures was not conducted for this study, students self-enrolled themselves into class groups based on personal timetabling preferences (thus adding some levels of randomness in class group assignments) – statistical analysis was conducted to ensure there are no significant differences of pre-test scores amongst all class groups before proceeding to make comparisons with post-test scores.

As data was collected in 2 different locations, location threat was taken into consideration. It is imperative to note that data collection of Study 2 was collected in Vietnam and Australia by the same researcher (this author). As such, measures were taken to ensure that conditions of both locations are as similar as possible when the study was conducted. The computer labs used for both campuses were closely similar in terms of hardware specifications and configurations. The course content used in class was the same between both campuses and students were provided with the same instructions when the study was conducted.

In ensuring reliability of the data instruments, prior to the finalisation of the coding frames of Study 1 and 3, pilot and trial codings were conducted with a 2 weeks interval as a measure of

ensuring consistency in categories and keywords identified from the transcribed interviews, before the coding frame was finalised and data was interpreted. The questions devised for the performance tests were based upon lesson materials that were used by lecturers in DDM1 and DDM2. 3 lecturers also reviewed the performance tests before it was administered in Study 2, ensuring the overall level of difficulty of the tests are adequate for the students.

3.5.2 Assumptions and Limitations

In terms of assumptions - both Vietnam and Australia campuses offer courses with identical curriculum and student exchanges between the Vietnam and Australia campuses is a frequent occurrence in the university. Given that the program offers flexible global mobility for students to transfer between campuses, it is reasonable assumption to determine that both cohorts of Vietnam and Australian students tested in this study have the same foundational level of knowledge in design.

In terms of limitations, while it is acknowledged that randomised controlled trials is deemed the most ideal data collection method, it could not be implemented in the context of this study due to the lack of availability of students and limited access to computer laboratories outside class hours. As such, convenience sampling was used, in which Study 2 used intact class groups of Design for Digital Media 1 and Design for Digital Media 2 to form control and treatment groups. While formal random sampling procedures were not undertaken, it is imperative to note that students self-assigned themselves into class groups based on personal timetabling preferences during course enrolment. As such, assignment of students into groups was random in an informal sense. To overcome this limitation, statistical analysis was applied to ensure equivalence and normal distribution between groups.

Due to limited time and limited access to students and computer lab facilities, the intervention in Study 2 was conducted in a single session, where students completed both pre-test and post-tests within the same session. While best efforts were made to ensure students in the treatment group had ample time to explore all features and complete tasks in *Virtual Designer*, students should ideally play the game in different settings (in class and outside of

class) over the interval of one full semester. This will allow students more time to form better assessment on *Virtual Designer* as a learning tool. More crucially, students' positive feedback about the game maybe be attributed the novelty of using game technology in class. The extended use of *Virtual Designer* over a longer period of time and a subsequent re-test on the same group of students could enhance reliability of the data collected in this study.

Lastly, limitations of sample size need to be addressed. The student sample size of the Australia campus was considerably smaller than sample size in Vietnam due to differences of semesters between both campuses (Vietnam runs the program three semesters per year, while Australia runs two semesters per year). As such, only DDM2 was offered in Australia when Study 2 was conducted, resulting in a smaller sample size than student cohorts in Vietnam. There were differences of sample sizes for Study 1 and Study 3 (lecturers' pre/post-game interviews). In the post-game interview stage, 9 lecturers have left the institution or were not available to participate in the play testing of *Virtual Designer*.

3.5.3 Ethical Considerations

Before Study 1, 2 and 3 were conducted; lecturers and students were provided with printed information about this research. This information was reiterated verbally before data collection. Lecturers and students are also made aware that participation is voluntary and each participant signed a consent form before collection of data. All research instruments used in this study have been reviewed and approved by the Coventry University ethics committee. Formal permissions were also obtained from university administrators of both Vietnam and Australia campuses prior to conducting data collection.

As Study 2 was conducted in a classroom setting and involves student participation, extra measures were taken to ensure that the data collection process does not affect students' academic performance in the course. Students were made aware that the pre-test and post-tests were conducted strictly for the purpose of this study and results from both tests will not be calculated towards their course grade for the semester.

Given that different learning interventions were applied on different class groups (control group students studied with traditional teaching methods, whilst treatment group students played *Virtual Designer*), it is imperative to note that no students were disadvantaged from using different learning approaches in class. The class during which data was collected was a review session, in which students used different methods (traditional teaching vs digital RPG) to review design theories before completing the post-test. All students have already been taught the course content on preceding weeks by means of standard teaching delivery during lectures. As such, this study had no influence in students' learning of course content. Upon completion of Study 2, *Virtual Designer* was made accessible to students in the control group as an additional resource for students that might be interested to utilise the tool for their own learning.

3.6 Summary

This chapter presented the context and setting of this research and overall research methods, study designs, research instruments, data collection and data analysis methods. The assumptions and limitations of this study were also discussed. This study will be using a triangulated mixed-methods approach and perform data collections using interviews, pre-test/post-test, opinion-based survey and focus groups. Triangulated data will be performed, where data will be collected from students and lecturers to achieve conclusive findings. Three studies (Study 1, Study 2 and Study 3) will be performed sequentially, which will be presented separately in the following chapters. Chapter 4 will describe research procedures and present data analysis results of Study 1 – *Virtual Designer* Requirements (Lecturers).

4 Study 1: Virtual Designer Requirements (Lecturers)

4.1 Introduction

Chapter 3 presented the research methodology, research design and data collection methods to investigate the research questions of this study. This chapter will describe data collection procedures, data analysis method and findings of Study 1: *Virtual Designer* requirements (Lecturers). Focusing on 12 digital media lecturers' perceptions, Study 1 aims to identify learning outcomes, teaching challenges and learning challenges of digital media courses, which will inform the overall game design and educational objectives during the development phase of *Virtual Designer* (Chapter 5).

As previously described, research findings of two secondary research questions (S1 and S2) will answer the primary research question:

Could digital RPGs be implemented in classrooms as an effective learning tool for students to accomplish learning outcomes of digital media courses?

Study 1 will investigate secondary research questions (S1, S2) and the associated sub-questions:

S1: What features or elements of digital RPGs could be used for students to accomplish desirable learning outcomes and overcome learning challenges in digital media courses?

S1.1: What learning challenges do students commonly face when studying digital media courses?

S1.2: What teaching challenges do lecturers commonly face when teaching digital media courses?

S1.4: Which features or elements in digital RPGs did lecturers find the most useful in accomplishing learning outcomes and overcoming teaching and learning challenges?

S2 Which types of learning outcomes in digital media courses could best be supported through digital RPGs?

S2.1 What are the desirable learning outcomes of digital media courses?
S2.2 How could in-game tasks be designed in digital RPGs to align with learning outcomes of digital media courses?

4.2 Participant Characteristics

Sample selection of Study 1 was conducted through a purposive sampling approach. 3 key selection criteria were set to ensure collected feedback from participants is valid towards addressing the research questions:

Criteria 1: The participating lecturer must have at minimum 3 years of teaching experience in higher education.

Criteria 2: The participating lecturer must be employed full-time in the university and have taught a minimum of 1 year in the Bachelor of Design (Digital Media) program.

Criteria 3: The participating lecturer must have current or previous experience working as digital media practitioners in this industry.

The population of lecturers teaching in the Digital Media program is 19. Participation was voluntary. 5 lecturers did not meet the selection criteria and 2 lecturers did not participate due to unavailability. In total, 12 lecturers from the digital media program (10 from Vietnam and 2 from Australia) fit all selection criteria and agreed to participate in Study 1.

The courses taught by the participating lecturers are diverse, ranging from traditional drawing, graphic design, web design, sound design, photography, video production, art history, 3d animation and digital compositing, demonstrating a good representation of different discipline areas within the field of digital media. All participating lecturers are experienced educators and industry practitioners, conducting day-to-day teaching delivery and preparation of course materials. In addition to teaching delivery, lecturers also evaluate students' academic performance through various forms of assessments, such as critique sessions, class projects, essays, written examinations etc. In Study 1, participating lecturers will provide their input as experienced digital media educators, subject-matter experts and industry practitioners, essentially guiding and informing the instructional design of *Virtual Designer* to ensure the game meet learner needs and closely aligns with desirable learning outcomes of digital media courses.

4.3 Data Collection Method

Semi-structured interviews were conducted with 12 lecturers prior to the game development of *Virtual Designer.* The interviews focused on collecting lecturers' input on desirable learning outcomes, teaching and learning challenges of digital media courses, and overall perception on the feasibility of using digital RPGs as learning tools to accomplish learning outcomes of digital media courses. The interview format is semi-structured, enabling the researcher to probe interviewees with additional questions if further elaboration of responses is required. The qualitative results (Section 4.7) will inform the instructional design, in-game tasks and educational objectives of *Virtual Designer*.

An interview guide was used in Study 1, serving as a checklist for the researcher to cover relevant points of discussions. The interview guide is divided into 6 sections, with each section consisting of 3-6 questions.

4.4 Discussion Points

The questions in the interview guide covered 4 key discussion points – (1) desirable learning outcomes, (2) teaching challenges, (3) learning challenges and (4) the implementation of digital RPGs in digital media courses. These 4 areas were designated as main categories within the coding frame structure (see Appendix 1) during the data analysis process. The rationale behind the discussion points are described as below:

Discussion Point 1: Desirable Learning Outcomes

The involvement of lecturers is essential to ascertain that *Virtual Designer* is well aligned with formal educational objectives and learning outcomes of digital media courses. As subject matter experts, the lecturers will identify and describe desirable learning outcomes for digital media courses. They will elaborate on why these were determined as desirable learning outcomes for digital media courses and prompted to discuss what measures were usually taken to ensure such outcomes are successfully achieved in their classes.

Discussion Point 2: Teaching Challenges

Lecturers will identify teaching challenges they have often encountered throughout their experience in teaching digital media courses. This includes issues relating to teaching delivery, learning design, assessments, course materials, classroom management, timing, etc. Lecturers will be asked to discuss teaching methods they typically use to overcome these challenges – and whether or not such measures were effective.

Discussion Point 3: Learning Challenges

Lecturers will be asked to describe learning challenges that students commonly faced when studying digital media courses. Collected feedback on teaching and learning challenges will be cross-examined to identify common pedagogical issues encountered in digital media courses from the educator's point of view. Were there teaching and learning challenges recurrently identified by lecturers? Could digital RPGs fit in as a feasible solution to address some of these challenges? These insights will inform the instructional design of *Virtual Designer*.

Discussion Point 4: Implementation of Digital RPGs in Digital Media Courses

Lecturers will discuss their overall perceptions of digital RPGs. The discussion will then proceed with seeking input from lecturers in identifying any possible attributes of RPGs, which they feel could potentially be fitted into an educational context to help achieve desirable learning outcomes and overcome the teaching and learning challenges of digital media courses they have identified at the beginning of the interview. Lecturers will also be encouraged to offer suggestions on learning design or game tasks, which could be embedded within a digital RPG to achieve learning outcomes.

4.5 Data Collection Procedures

The semi-structured interviews were conducted on both Vietnam and Australia campuses during Semester 2, 2014. All participating lecturers received a consent form and a copy of the interview guide three days before the scheduled interview. The interview sessions were conducted face-to-face on an individual basis and averaged at 60 minutes in duration. All sessions were audio-recorded and transcribed into audio transcripts to be used as a source for data analysis.

Each session began with the researcher providing an overview on the premise of this study to the participant. Participants were informed that the interview session would be audio recorded. Participants were also assured of anonymity and confidentiality of information they provide in the interview. Questions of Section [A] (demographic questions) was first presented, where lecturers provided information about themselves, such as their higher education teaching experience, specialisations and digital media courses they teach.

The conversation progressed to key areas of discussions – [B] learning outcomes, [C] teaching challenges and [D] learning challenges. At the beginning of each section, lecturers were asked to clarify their understanding of what learning outcomes, teaching challenges and learning challenges mean to them. Following that, lecturers were asked to identify key learning outcomes, teaching challenges and learning challenges of digital media courses. In some instances, the responses were probed to elicit further elaboration and clarification from

lecturers. A number of lecturers shared personal stories and experiences that they have previously encountered when teaching digital media courses.

Sections [E] Role-Playing Games, [F] Digital RPGs for Digital Media Courses and [G] Lecturers' Roles in Using RPGs consists of questions related to RPGs. 10 out of 12 lecturers in this study had no experience playing digital RPGs. Prior to answering Sections [E], [F] and [G], lecturers watched 3 short gameplay videos of RPGs. Following that, the researcher described key game characteristics that defines games in the RPG genre. As functionalities of different genres often overlap one another, standard definitions of genres tend to be subjective (De Byl 2009). The videos and explanations were provided to ensure all lecturers had an accurate understanding on key game mechanics and attributes of RPGs to avoid possible misconceptions (for instance - mistaking simulations or virtual worlds as RPGs) before proceeding with discussions about how learning outcomes and teaching challenges could potentially be aligned with RPG game design and objectives. The interviews ended with lecturers being prompted to provide suggestions on possible in-game tasks that could be incorporated into RPGs for digital media courses.

4.6 Data Analysis Procedures

Collected text data in Study 1 will be analysed through the systematic process of the qualitative content analysis method. All audio recordings of the interview sessions were transcribed verbatim. Individual interview transcripts were then imported into qualitative analysis software (NVivo 11). Each interview was assigned a code [L1] – [L12] to provide anonymity to participants' identities. After all interview transcripts were organised in Nvivo, a coding frame was constructed (Appendix 1) as a means of building an organised structure for the collected data. The coding frame structure consists of categories and subcategories that represent overarching concepts of the formulated research questions. The categories of the coding frame were based on discussion points outlined in Section 4.4, whilst subcategories were based on sub-questions of the research questions S1 and S2 (Section 4.1).

After the coding frame was constructed, a trial coding and pilot coding were conducted before progressing into the main analysis phase. The trial coding was conducted first, and the pilot coding conducted after an interval of 14 days. Comparison of coding outcomes will be made between trial and pilot coding. This step ensures the internal reliability of the coding frame, where consistency is achieved in coding at different time intervals.

Through a line-by-line process, text data in all transcripts were segmented into units of coding in NVivo. The units of coding consisted of singular words, phrases, sentences or entire paragraphs. Each unit of coding was organised into relevant subcategories that were created in the coding frame. As the coding frame structure was both concept-driven and data-driven, the process of segmenting texts into units of coding and organising these units into subcategories simultaneously evaluated the overall feasibility of the coding frame structure. During the trial coding phase, new subcategories were created to accommodate units of analysis from different data sources. Redundant or overlapping subcategories were removed or combined in the coding frame structure.

Upon completing the trial coding phase, all interview transcripts were re-coded in a pilot coding phase after a 2 weeks interval. Comparisons were made between coding of both trial and pilot phases to check for consistency. Once again, evaluations and modifications were made on the coding frame structure, ensuring all categories and subcategories reflect the main focus areas that would address the assigned research questions. After the pilot and trial coding phases were completed, the main analysis was conducted. Text-data in transcripts were re-coded and organised into relevant subcategories of the finalised coding frame. Resulted qualitative findings were interpreted and presented through continuous texts descriptions and data matrices.

4.7 Findings

4.7.1 Desirable Learning Outcomes of Digital Media Courses

During the interview, lecturers were asked to identify and describe what they thought were the most desirable learning outcomes of digital media courses. Lecturers were asked to identify at maximum 4 desirable learning outcomes.

Lecturer	Desirable Learning Outcomes of Digital Media Courses					
	Theoretical Knowledge	**Design Language**	**Applying Knowledge**	**Conceptual Skills**	**Soft Skills**	**Learning Skills**
L1	x	x	x	x		
L2	x	x	x			
L3				x	x	
L4	x	x				
L5	x	x			x	
L6	x			x		
L7						x
L8					x	
L9			x			x
L10	x	x	x			
L11	x		x			
L12	x	x				
Total (12)	**8 (67%)**	**6 (50%)**	**5 (42%)**	**3 (25%)**	**3 (25%)**	**2 (17%)**

Table 7 - Desirable Learning Outcomes of Digital Media Courses

As Table 7 indicates, the desirable learning outcomes identified were theoretical knowledge (8 [67%]), design language (6 [50%]), applying knowledge (5 [42%]), conceptual skills (4 [33%]), soft skills (3 [25%]) and learning skills (2 [17%]).

4.7.1.1 Learning Outcome 1: Solid Theoretical Knowledge

The desirable learning outcome most cited by lecturers was students having acquired solid theoretical knowledge (8 [67%]) to produce high quality digital media outputs. L2 explained the essentiality of theoretical knowledge:

"…the most important learning outcome is students are able to understand the theory, apply it and to answer the question, responding to a need of a design brief. They should be able to be creative within constraints of a brief. And to do so, you need to understand your design theories." **[L2]**

In the field of digital media, creative outputs are often produced based on a set of requirements and constraints outlined in design briefs. As described by L2, taking into account of constraints, creative responses to design briefs are dependent on the student's level of theoretical understanding and the ability to apply the theories into their works. Discussions on theoretical understanding transgressed into lecturers making observations on the tendency of students to prioritise technical software skills over theoretical knowledge, describing instances where student works were not informed by design theories, thus impacting the quality of creative output:

"Most of them is all about creating cool stuff and using technology but most of them do not know that to do this you need to have theoretical background to have a better understanding.... People won't expect you to just be a technician to use software, you need theory to produce good work. They have all the technology that is needed – but they think that it's easy to create things but if you have no theoretical background you are just creating visuals – anybody can do that." **[L4]**

In the statement above, "*cool stuff*" refers to creative outputs that are aesthetically pleasing but lacked conceptual depth. L4 noted that students have a misconception that technology (software, hardware) and technical skills produces visually interesting works, but a solid theoretical understanding is a necessity to inform the design of such works. Lecturer L6

expressed the same opinion and provided a vivid account on a scenario often encountered in class:

"*For compositing – the learning outcome is to understand the cinematic value of a shot and trying to improve it. A lot of kids in compositing class, they think, ah, I gotta' add in fire, smoke - software, you know. Now, it's asking them – if you were a director, if you have the budget, what would you spend the money on to make the film not look cheesy? We're not talking about trying to make it look like a Michael Bay film, but just – what should he fix? And that's what compositing is about – to make the movie more cinematic."* [L6]

To accomplish ideal "*cinematic value*" described by L6, students will need to have a good level of comprehension in theories associated with cinematography. For instance, general concepts of cinematography techniques: How did the director use *Mise en scene* to produce different effects or evoke emotions? How does different shots influence the conceptual and abstract meaning which audience interprets? How does different camera angles communicate the emotion of characters? These theoretical considerations directly influences the creative outcome – in this example, the cinematic value of a movie. Both statements from L4 and L6 implies that theoretical knowledge precedes technical execution in terms of level of importance, as it enables designers to make informed design decisions when creating digital media works that communicates to audience effectively.

Notably, an interesting observation in L6's statement was how the lecturer have asked students imagine themselves in the role of a film director:

***"Now, it's asking them – if you were a director, if you have the budget, what would you spend the money on to make the film not look cheesy?"* [L6]**

The lecturer encouraged students to consider their decisions from the perspective of a design practitioner. In this instance, the lecturer mentioned, "…*if you have the budget"* – effectively

placing students in a hypothetical situation grounded in the reality on how digital media practitioners are often forced to work within budget constraints. This brief statement demonstrates how the lecturer attempts to situate students in a real-world context within a classroom environment, which reinforces the premise of this study - to investigate the learning effectiveness of digital RPGs as a platform for students to role-play as design practitioners (in this example, a film director) and perform real-world tasks in a simulated setting.

The lack of theoretical knowledge also hinders students' ability to properly justify and articulate their work:

"They should understand every reason behind it – I'm using this element because of this, why I'm using this colour – there's a reason behind why they are design. There is too much in design, but if they don't have theoretical foundation, it's a problem." **[L4]**

"*For instance, a bus drives by – and I say hey – does it help with the story, or does it distract from the story the director is trying to tell? I'm not just saying – hey erase the bus so we'll learn how to do it. Why it should be done. Establishing a context on WHY they're doing it as opposed to just doing it."* **[L6]**

Both comments above reveal an important step in the development process of design, which is the justification of design decisions made from initial concept to final completion of the design piece. Informed by theoretical knowledge, digital media practitioners often make conscious design decisions to visually communicate their ideas. In digital media courses, this design process is often emphasised in class, where students are often asked to explain and justify the rationale of their design choices. For instance, the reasons on why a particular colour scheme, typeface and image was used in the design. Students must have a strong theoretical understanding to articulate and justify the design decisions that driven the final creative output.

On a final note, L5 commented: "**When you talk about elements of design – even in semester 3 they forgot about that…**" - The "*elements of design*" refers to a foundational design theory covered at the very beginning of the first semester. This comment highlights the issue where students' weak theoretical knowledge may be attributed to poor retention and recall of knowledge acquired from prior semesters. This issue warrants consideration when planning the instructional design of *Virtual Designer* in the next phase, in which the in-game tasks should encourage knowledge recall and reinforce knowledge retention.

4.7.1.2 Learning Outcome 2: Proficiency in Speaking the Design Language

Half the cohort of lecturers (6 [50%]) cited proficiency in speaking the design language as a desirable learning outcome in digital media courses. As previously described, the most desirable learning outcome for digital media students is to acquire a solid theoretical knowledge. In doing so, students should also be able to "*speak design*":

"I say to them, you should learn the language, you should speak design. The problem here, you think that this is just something unimportant and you are more into the aesthetics of design. But if you don't use these vocabularies, this is a gap. The theories are not to make things complicated for you, if you know about the vocabularies it actually makes it easier for you. And I don't understand why they don't learn and use theories and to develop interesting works. That is something that could be prioritised. It's something we need to work on. If they know their theories it will be easier." **[L5]**

The "design language" refers to the vocabularies of design. These design vocabularies are specific terms and terminologies used by practitioners to communicate, articulate and critique works in the field of digital media. Within classroom settings, students learn new vocabularies through the theories of design. L5 suggests that proficient use of design vocabularies and theoretical knowledge are both essential skills to produce interesting works. Similar to learning outcome 1 (Section 4.7.1.1), where lecturers described how students were

prioritising software skills over theoretical knowledge - L5's comment above is an observation on how students appears to prioritise the aesthetics of the design, neglecting the use of design language and theories in the process. It appears that knowing the design vocabularies eases the design process and workflow. L1 considers the importance of design language from a communicative perspective. :

"Also, language. For example, students that can design very well, they don't know how to express it. They have applied design principles, but they don't know how to express or say it in words – they don't know how to articulate it using design language. For posters, they applied the right colour scheme, but they don't know how to say this is analogous… this is complementary." **[L1]**

The terms "analogous" and "complementary" are terminologies of colour schemes in colour theory. As described in Learning Outcome 1, part of the design process is to justify all design decisions made with theoretical knowledge. L1's statement reaffirms this point of view and noted the issue, where students appear to be capable of applying design theories but are unable to articulate their works using the design language. Both responses from L1 and L5 indicate how the role of a digital media practitioner goes beyond creating visually aesthetic works, that an essential skill every designer should have is the ability to articulate using the design language. In not having a solid theoretical understanding on design theories, it puts forth a cascading effect on students' ability to communicate and explain their works using the design language. Aside from a lack of theoretical knowledge, students' lack of proficiency in design language could be attributed to language skills, as L2 observed:

"*Are they able to articulate using design language? – it's getting there – that's the objective. It is a problem – also the fact that they are non-native language speaker.*" [L2]

As the student cohort of the Vietnam campus primarily consists of local students, participants in this study are mostly non-native English speakers. While all students meet the university's

English entry requirements when enrolling into the digital media program, the experience of learning new design-specific vocabularies and terminologies may be a challenging undertaking for non-native speakers of the English language. When queried on why design language was considered a desirable learning outcome, some lecturers noted that being able to articulate and critique works is an essential skill used by practitioners in the industry:

"These are skills you'll need in the industry. They speak the design language - the practitioners... and there's always constraints in brief in projects, even if you want to be creative". **[L2]**

"I mean, criticism is very important aspect of designer, giving critique, critiquing work, colleagues, generally see, clients, current identities you need to be able to articulate your thoughts about the visuals and how it feeds, giving it or receiving it, colleagues, boss, clients." **[L8]**

Both responses referred to design language as a required practitioner skill within the real-world context. L8's comment in particular highlighted critiquing as an important skill for a designer. In doing so, proficiency of design language is required for designers to clearly articulate and convey their ideas to clients, colleagues and manager.

4.7.1.3 Learning Outcome 3: Applying Knowledge

The 3rd most cited desirable learning outcome was for students to apply knowledge (5 [42%]). On quality of student works, L1 commented, "***…they understand the theory but the problem is they don't know how to apply it. You can see from the works.***" L1's observation differs from earlier comments about students' theoretical knowledge (Learning Outcome 1), in which students' quality of work were attributed to a lack of theoretical understanding to inform the design throughout the development process. Rather, L1 believed that students do have a reasonable comprehension of design theories - but were unable to apply it into practical contexts.

Looking at a broader context however, L9 described how some students are unable to recognise connections and proficiently apply knowledge and skills across different settings and situations:

"Whether if they are able to extrapolate that to, this is just a model or pattern I could apply to somewhere else … some people are able to take one thing and say oh, this is sort of a tool somewhere else, other people are sort of thinking this is just for this, and they are not able to kind of use that tool for anything else." **[L9]**

Aside from knowledge retention and recall, such examples of knowledge transferal – the ability to acquire information or skill – whether an abstract knowledge, a practical skill, a concept, etc., and successfully implement that knowledge into different contexts is a core skill for practitioners. Within a classroom setting, lecturers reinforce this skill through different teaching methodologies, one of which is in-class exercises (4 [33%]). In one example, an exercise was conducted in a Sound Design class. The lecturer (L5) provided students with a short movie clip depicting a suspenseful scene of a character making an entrance into a French national bank, about to execute a bank heist. Students were asked to select an appropriate music track that will fit with the genre and mood of the movie clip. L5 described how students were encouraged to explore beyond the subject area of sound design, and consider cinematography and visual research as part of the process in accomplishing the task of sound track selection:

"Directly they've been to view some French accordion music… We talk about creating a portrait of the character – when I ask them how many characters in the movie … I try to provide some understanding on cinematography and try to review something like the guy – you can develop a main theme or organic feel about this guy. For the building – is that a small bank? It's a big bank – we pull out what is the material that constitute that building, how it looks like this building … we come up with this mind-mapping and we come up with the concept of complexity … if you take that, let's write on Google search – complex music structure – we highlighted some classical music in

the 20th century that is complex, and jazz. I try to ask them to research to pull up understanding and concept of the idea." [L5]

As described by L5, as the bank depicted in the movie was a French bank, students immediately associated French banks with traditional French music. This demonstrates a surface level understanding on music genres. Students were encouraged to think deeper and make closer observations on the movie clip elements. This transcends to students making further considerations on the movie clip's overall cinematography and visual style. Observations were made to construct a portrait of the character – Who is he? What is his personality? Similarly, observations were made on the bank – it's a French bank - but how did the exterior architecture looked like? How did the interior looked like? Students were asked to gain a further understanding by conducting visual research on similar French buildings. After an extensive research and discussion, the class arrived to select 20th century classic jazz as their choice of sound track for the movie clip.

In this example, the task of selecting a sound track for a movie clip appears deceptively simple, but the final track selection was informed by knowledge extrapolated from several other subject areas, which students have learned from other courses. Elements of cinematography, narrative and design concepts were involved. When initially approaching the task - students were unable to connect and apply disparate concepts from different subject areas into a music-selection task. Using inquiry-based techniques, L5 took a scaffolding approach in guiding students through the task, thus encouraging students to associate different concepts together to construct knowledge, rather than simply reproducing facts through surface-level understanding. This is an active learning approach from the constructivist view of learning, which will be revisited in Section 4.8.2.

4.7.1.4 Other Learning Outcomes

Some lecturers (3 [25%]) believed that students should develop strong conceptual skills as a desirable learning outcome. L3 noted that brainstorming for ideas as part of the conceptualisation process:

"…Learn how to come up with ideas, learn how to take those ideas and put it into implementation." **[L3]**

Soft skills (3 [25%]) was also mentioned as one of the desirable learning outcomes of digital media courses. Examples of soft skills cited were skills on collaboration, presentation, time-management, research, etc. L8 considers soft skills as priority over content delivery, stating: **"… the most important ones are not content based. So collaboration, not maturity, but the fact that they going to organize their time, accountability." [L8]**

A particular soft skill mentioned by 2 lecturers was collaborative skills – the ability to work in teams:

"It's important because when they get into the real world, they have to work with other people – it's pretty rare in the film field, where they work independently. Team work and be able to share ideas, come up ideas really quickly, to be able to troubleshoot problems is important." **[L3]**

"*… Everybody needs to collaborate, but some individuals, some students can be very comfortable working in teams and they should definitely develop that because later on they would take a position where they manage people or stuff like that."* **[L8]**

In discussing collaborative skills, both lecturers referred to how it relates to expectations in the industry, in which real-world projects are often a completed as a collaborative effort with close interaction with other practitioners in the industry. Lastly, 2 lecturers (17%) felt that students should develop learning skills as a desirable learning outcome. L7 noted that students should develop themselves as independent and lifelong learners, even after completing the degree and transitioning into the industry:***"… to learn by themselves, which will carry on not only student life, but also when they start working."***

4.7.2 Teaching Challenges

Lecturers were asked to describe teaching challenges they have commonly encountered when teaching digital media courses. Follow up questions were also asked to determine the measures lecturers typically take to overcome the teaching challenges identified (e.g: *What measures do you take to tackle these teaching challenges when teaching design courses? Did you find that the measures you described were successful in tackling the teaching challenges?*). As Table 8 indicates, 3 common teaching challenges were identified during the interview: engaging students (7 [58%]), learner attitude (5 [42%]), and others (4 [33%]).

Lecturer	Teaching Challenges in Digital Media Courses		
	Engaging Students	**Learner Attitude**	**Others**
L1	x		
L2		x	
L3	x	x	
L4			x
L5		x	
L6	x		x
L7	x	x	x
L8			x
L9	x		
L10		x	
L11	x		
L12	x		
Total (12)	**7 (58%)**	**5 (42%)**	**4 (33%)**

Table 8 - Teaching Challenges in Digital Media Courses

4.7.2.1 Teaching Challenge 1: Engaging Students

One of the main teaching challenges recurrently mentioned by lecturers was to engage students in class (7 [58%]). In most cases, students were described as being unmotivated

and bored in class. Lecturers attributed this poor engagement of students' to their lack of interest in the course or learning content:

"They are not interested in courses - they don't feel it's relevant… a lot of students taking the courses are not necessarily interested in the area, where you have a few that are really interested. Then you'll have students who are high performers and a few that are not because they are not really interested in that area." [L3]

"Trying to get unmotivated students on par with average students. It's tough. I have about 4-5 students in each class, they have no clue. I think they took my elective courses because they perceive as being the next best thing besides other courses. Lesser evil. I know they don't really like the subject." **[L6]**

L3 and L6 referred to students being uninterested in the courses and as a result – become unmotivated in class. The degree program consists of core courses and elective courses. L3 was referring to a core course. All students are required to complete all core courses in the program, which focuses on building students' knowledge on foundational theories, conceptual skills and general technical skills. L3's statement – *"…they don't feel it's relevant"* is indicative on how students are not able to recognise how the knowledge they acquired could be feasibly applied into different situations or subject areas. As discussed in Section 4.7.1.3, some lecturers have made this observation when discussing "applying knowledge" as a desirable learning outcome.

The elective courses are comparatively more specialised than core courses. Students may select elective courses based on areas they are interested to pursue in the field of digital media – for instance, aspiring 3d animators will choose to study an Advanced 3d Animation course, while students interested in web design may opt to study Advanced Web Authoring. However, the elective courses offered each semester varies and are subject to availability. This in turn results in situations where students are not able to find an elective course that interests them, and resorts to – as L6 described - selecting *"the lesser evil"*. The result is a

general lack of motivation and engagement of these students in classes, posing a teaching challenge.

Two lecturers (L7, L9) however attributed the lack of engagement to students' lack of interest in some areas of the learning content:

"The biggest challenge is making the interactive course something they are interested in… they associate coding with something that is really boring." **[L7]**

"My big problem is trying to make dry material exciting. Stuff that is really fundamental but there's no spin – I can't use a local example. For example, communication theory – here's the model, here's the signal, here's the messenger and receiver – here's an example - the whole class is yawning. And internally, I'm yawning." **[L9]**

In both comments, students were described as showing a lack of interest in the subject material of the course. The problem appears to occur in both theoretical and practical lessons. The coding mentioned by L7 refers to web coding fundamentals (HTML, CSS, Javascript, etc.) - a relevant technical skill required for students interested in pursuing web design as a specialisation. In L9's course, which is more theory-based, the lecturer's comment revealed the struggles of getting students engaged in certainly lesson materials that are boring to learn and teach. In effort of sustaining student interest and keeping them engaged in class, lecturers employ different teaching methods to overcome this teaching challenge. L9 speaks of allocating lesser class time on delivering boring lesson materials and dedicating more effort on relevant in-class exercises to keep students engaged throughout the class:

"If I know that's coming up, which I usually do, I won't spend all class on that, we'll try to do something else. So we'll have a balance, so we're not dragging the whole class out with that, trying to find the exercise – even if it's not directly related to that, trying to keep the energy level up, that's my own philosophy of working in class." **[L9]**

When asked if this method works, L9 agreed that it does work sometimes. The lecturer also attempts to set an example to be excited when delivering the material, in hopes of having students interested in the subject:

"Sometimes. Because if I seem I'm interested or excited/concern on the material and hopefully it rubs off." **[L9]**

L5 acknowledged students' short attention span and how continuously long lectures were not conducive to learning. To overcome that, L5 screen videos in classes to keep students engaged, and finds that this use of media was more effective in sustaining student interest, compared with lecture sessions:

"If you have 2 hours straight lecture, 10 minutes later everyone is sleeping already… I try to find a video to talk about a certain topic – they are more interested to watch video than listening to lecture." **[L5]**

4.7.2.2 Teaching Challenge 2: Learner Attitude

5 lecturers (42%) mentioned learner attitude as one of the teaching challenges they often faced in class. These issues relating to students' attitude in learning varies, such as level of effort in assignments, participation in class, etc. L1 described the experience of encountering students with a lazy and unmotivated attitude:

"Their attitude – those who are lazy, don't know how to motivate them. Lazy and unmotivated – if you keep pushing them, they are still doing the same thing. Let's say weekly homework – every week when I ask them I want to see their work, only a few, less than 5, compare with last semester, more than 80% they did their work." **[L1]**

The lecturer (L1) sets milestones in class each week to provide verbal feedback on students' work-in-progress in their assignments. This measure appears ineffective, as students

disregarded the lecturer's request and simply did not produce the works as instructed. As L1 acknowledged, the level of effort from each cohort of students varies – students from previous semester demonstrated a higher level of effort in completing the works as requested.

L7, L5 and L3 reported passivity amongst students as an issue:

"They are too shy. It's not lack of knowledge, even though we build a good rapport, when it comes to class time – even if I ask if they have any questions, I see no hands. And at the end there are still some problems that they still don't get but they don't ask. They are really passive in one-way or the other." **[L7]**

"They are waiting too much from the lecturer to show everything, there is not really some initiative taken from them." **[L5]**

"They're passive, they don't see that as learning, they don't feel like they're getting info from lecturer – they feel like teacher isn't doing their part – they should be up there showing us and we just take it in. For them part of it could be because of that big change and that's a struggle for them, it's a struggle for them to just open up." **[L3]**

The above statements (L3, L5, L7) refer to students from the Vietnam campus. A contributing factor to the lack of participation and initiative may be due the change of learning environment students experience as they transition from a high school to university environment. The Vietnamese high school education system is primarily teacher-centered with a traditional "sage of the stage" approach, where knowledge is transmitted by teachers through one-way teaching delivery, while students listens in audience and absorb knowledge through rote learning, with little interaction or discussions during the learning process. In university setting, students need to adapt and accustom to a student-centered teaching approach, where active discussions and interaction between students and teachers are often highly encouraged in class. Some students find difficulty adapting to such learning environment and as a result, remains to be passive and shy learners in class.

Other issues highlighted learner attitude were students' approach towards their assignments. Students were described as lacking creativity, or procrastinating on getting the work started:

"Having them to be really creative by themselves. They are creative but being creative for their own sake, not for the assignments." **[L2]**

"Just getting students to get the work started on time – a lot of time it's poor time management." **[L3]**

4.7.2.3 Other Teaching Challenges

Other teaching challenges mentioned were issues relating to large sized classes. Due to large student numbers, two lecturers (L7, L8) noted that they were not able to spend sufficient time to view the work-in-progress of student assignments to provide necessary feedback:

"*It's also hard to see everyone's work in progress. This semester I have 50 students which is why I can't do it, I give verbal feedback."* **[L8]**

"The workload is huge. The workload for me is huge. You get students lining up, especially during assignments – basically I have students hunting for me, waiting outside my door, asking if I could look at their work. So that's one of my biggest challenge. Especially when I have 60 students right now in 2 classes." **[L7]**

4.7.3 Learning Challenges

Lecturers were asked to identify the learning challenges students often struggle with in class:

Lecturer	Learning Challenges of Digital Media Students					
	Articulating Works	**Applying Theories**	**Conceptual Skills**	**Learner Attitude**	**Soft Skills**	**Theoretical Knowledge**
L1	x	x		x	x	x
L2			x	x		
L3			x		x	
L4	x	x		x		x
L5	x	x			x	x
L6			x	x		
L7	x	x		x		
L8	x		x			
L9			x			
L10	x	x				
L11	x			x		
L12		x	x			
Total (12)	**7 (58%)**	**6 (50%)**	**6 (50%)**	**6 (50%)**	**3 (25%)**	**3 (25%)**

Table 9 - Learning Challenges in Digital Media Courses

4.7.3.1 Learning Challenge 1: Articulating Works

7 lecturers (58%) relayed that students struggle with articulating and critiquing works. As previously discussed in Section 4.7.1.2, critiquing is an essential skill for practitioners to communicate ideas and discuss opinions. L8 feels that students' struggle to discuss their opinions in class and critique other works. Students appear to be passive in participation (consistent with L5 and L7's comments about passive learners in Section 4.7.2.2). The lecturer was unsure what causes this difficulty and wondered if cultural conventions play a factor in prohibiting students from freely critiquing works:

"The critique – there is maybe a difficulty for our students to critique – to write their opinion and discuss another piece, is it fear of being too direct? Is it fear of saying some that's not relevant? Is it a social convention? I don't know, but it's hard to, you know, engage discussion." **[L8]**

The same articulation problem was highlighted by L5, who described that students find difficulty explaining works. L5 attributed this learning challenge to a lack of proficiency in the design language (described in Section 4.7.1.2 as a desirable learning outcome) and relates that students are not speaking with the right vocabularies used by practitioners:

"Language a problem – when you ask them to use a design language… to describe something, it's hard for them… First it's because they don't know, they haven't learn, they don't know which word to use – then it's not professional language they use." **[L5]**

On the other hand, L1 and L7 believe that the poor articulation of works may be due to poor analytical skills:

"They know the knowledge, they can apply it but they can't explain it. Is it because of language? I don't think so. Before the presentation, I ask them to analyze other advertisements they can explain it. <u>But when their own work – they won't explain their own works</u>." **[L1]**

"I show practical examples but you know when you really put an example there, and tell them, please analyze this – <u>they can analyze, but they cannot analyze their own work.</u>" **[L7]**

Both lecturers (L1, L7) regularly held critique sessions in their classes, where students are required to analyse and discuss a range of works, providing critical feedback on different aspects about the piece, such as layout, colour choices, concept, technical execution etc. The

critiques are often made on existing works created by other artists or students' own works. Like other courses, students are required to articulate using design vocabularies that they have learned in class.

In both instances, lecturers (L1, L7) commented that students were able to properly analyse and critique other artists' works, but were unable to explain works of their own. This observation draws attention to two issues. The first – where students demonstrate good capabilities in analysing and providing critical feedback on existing works by other artists, indicates that lecturers believe their students have a good grasp of theoretical knowledge in design and are able to recognise how the theories fit within the contexts of execution, thus providing appropriate responses during the critiquing process. The second issue – where students are unable to describe and analyse works of their own, is indicative that students may not have adequately applied design theories during the conceptualisation and creation of their works. As such, students struggle to justify and explain the overall rationale and concept of their produced works during critique sessions, as design decisions made throughout the creative process were not properly informed by the relevant theories and principles. 6 lecturers (50%) flagged the issue of students not adequately applying design theories into works as a learning challenge. This will be discussed in the next section.

4.7.3.2 Learning Challenge 2: Applying Theories into Practice

Lecturers (6 [50%]) described that students often struggle with applying theoretical knowledge into their works:

"They don't know how to use the theories for their practice." **[L5]**

"*Not knowing how to apply theory into works.*" [L1]

Lecturers made deliberate efforts to draw students' attention towards consciously considering and applying design theories into their works, but L7 commented that this measure is ineffective at times, as students' completed works did not reflect that level of understanding:

"…that's dominance, how do you apply that? Some students have a better sense, but others just goes – yea I know that, but when the design is put together, the sketches are put together in Photoshop or Illustrator – you just don't see it. They don't really get it." **[L7]**

L2 encounters a similar issue, where students disregarded instructions and proceeded to create works without adequately considering the theories during the design process:

"They try to go too fast to go directly to result – 2d is the same – when we give them instruction – nobody follow. They keep doing what they want." **[L2]**

To encourage students to apply theoretical knowledge into their works, lecturers set milestones (3 [25%]) and providing constant feedback (6 [50%]) to ensure students are executing their works with the appropriate design workflow and all works are adequately informed with related theories of design.

4.7.3.3 Learning Challenge 3: Conceptual Skills

Students also struggle with the conceptual development of their works (6 [50%]), described by lecturers as not being able to produce interesting content or original ideas. L9 described that this was partially due to a lack of worldly experience and exposure:

"The conceptual development. To be able to see the world more broadly – many of them don't have worldly experience – and some of that comes with age, but I noticed at the end, technical proficiency is not much of a problem with our students, but being able to come up with a concept that sort of multi-faceted, has different flavours is very difficult for them." **[L9]**

It is interesting to note L9's comment that students did not struggle with technical skills, but rather, producing interesting concepts are a struggle for them. L6 had the same opinion in this regard:

"I have students who were masters of software like I am but they could not create content at all, so they're just a walking help guide." **[L6]**

L9 and L6's statements echoes the comments presented in Section 4.7.1.1, where students were described as over-prioritising on technical know-how and omit other areas of design, thus affecting the quality of the creative output. However, as L1 noted, concept is an important part of the design process rather than only the final output:

"Concept is important but to them is as long as they are able to finish the work that's the most important part. The process is important; it's not just the outcome." **[L1]**

Good idea generation also increases student motivation in producing better works and achieving a timely completion, as L3 described:

"For video and narrative – they are not really skilled at it, some kids aren't really good at idea generation, an area of weakness – if you can't generate a good idea, you can't feel motivated. I find that students who have good ideas, especially in narrative class, they are very involved; they get the work done on time. When they can't get a good idea, they can't run with it." **[L3]**

It appears that from the lecturers' point of view, proficiency in software skills isn't quite an issue, but rather, creative content creation and conceptualisation is of a higher priority in student learning.

4.7.3.4 Learning Challenge 4: Learner Attitude

In discussions on teaching challenges, half the lecturers (6 [50%]) interviewed described learner attitude (Section 4.7.2.2) as one of the main teaching challenges they often faced when teaching digital media courses. In discussions on learning challenges, learner attitude has once again been flagged as something students commonly struggle with (6 [50%]), in

which students' attitude towards learning negatively impacted their overall learning experience in class. L4 described how students often underestimate the amount of hard work that entails from digital media courses:

"The mentality and how they think. A lot of design students thinking that it's a cool and fun thing – they are not supposed to be stressed. It's fun but it's a lot of hard work to reach a certain level that they want." **[L4]**

L6 had the same sentiment, explaining how students had unrealistic expectations and not willing to putting in the required level of effort to achieve results:

"I think it's greed too, they want their work look like everyone else but they don't want to put in the effort – what can you do about that? That's a big challenge – when we get to week 9 and we start to demand them to do work, and they start seeing other people's work – and like, what the hell. I can see it. It's a big challenge to the morale around week 9 and 10. They just give up in the end. They don't understand it's baby step, stepping stone." **[L6]**

Both statements from L4 and L6 demonstrate how students did not have an accurate understanding on real-world expectations for the digital media profession. To address this gap, lecturers such as L3 take students on studio visits and invite guest speakers to the classroom:

"Taking them out to the real world, post production facility so they can see - Guest speakers, so they can hear from people in the industry – exposing them to more things." **[L3]**

4.7.3.5 Other Learning Challenges

Other learning challenges mentioned were soft-skills (3 [25%]) and theoretical knowledge (3 [25%]). On soft skills, problems highlighted were poor time-management (L1), lack of

confidence and independence in learning (L5). L3 described how students often find it difficult to work in teams:

"*Students have a hard time working in teams. I got one now where I have to combine 2 teams for an assignment. The students don't want to work together, but I'm going to make them. It's important for them to learn together – even with people they don't want to work with – to simulate the real workplace, they're going to hate me, but they'll be positive experience in the long run."* [L3]

Despite students not being keen to work together, the lecturer is adamant that students work through their differences to complete the assignment. Through this process, the lecturer added a layer of authenticity in students' learning, like practitioners in the industry, students experience working collaboratively with different people to produce the work.

4.7.4 Digital RPGs for Digital Media

4.7.4.1 Feasibility of Digital RPGs for Digital Media Courses

When asked if digital RPGs could potentially be used to accomplish learning outcomes of digital media courses, all 12 lecturers' responses were positive, however some lecturers have stressed that the use of digital RPG will only be effective if the game was well designed to accomplish educational goals and well-implemented in classroom environments. L2 commented that the game could be used as an asynchronous learning tool and enable students to complete activities aligned with desirable learning outcomes:

***"I think it's interesting – because there's some advantages – they can do it on their own time – it applies activity to the understanding we expect them to have… The novelty of it is great – I would like to try it if I have it."* [L2]**

On feasibility of using digital RPGs to address teaching and learning challenges, 9 (75%) lecturers agreed, while 3 lecturers (25%) responded with "maybe" statements. L3 believed

that the use of digital RPG would serve as an ideal mode of learning for the current generation learners accustomed to the use of technologies, but cautioned that the game should be kept short to sustain interest:

"I think for young generation who grew up on games, computer, internet, apps, I think it has some strong potential – but it has to be short – it can't be long games." **[L2]**

L7 emphasised that learning content should be seamlessly embedded into the game, striking a balance of achieving educational objectives whilst keeping the game experience engaging for the students:

"It depends on how smooth the transition is from knowledge into the game, you know. It has to be between the 2 extreme – one is it's a really boring education game, just an obstacle to overcome, vs, become so much of a game experience, they actually want to apply and then watch it." **[L2]**

4.7.4.2 Digital RPG Suggestions

The lecturers provided suggestions and examples on how in-game tasks of digital RPGs could be designed to accomplish desirable learning outcomes and overcome teaching and learning challenges in digital media courses. Suggestions include the use of digital RPGs to simulate real-world scenarios (10 [83%]), to role-play as practitioners (7 [58%]), to simulate workplace environments (2 [16%]) and to create a collaborative learning experience (2 [16%]).

Lecturer	Digital RPGs for Digital Media Courses – Suggestions			
	Real-world Scenarios	Role-play	Simulated Environment	Multiplayer
L1	x	x		x
L2		x	x	
L3	x	x		
L4	x			
L5	x		x	
L6	x	x		
L7	x	x		
L8	x			x
L9		x		
L10	x			
L11	x			
L12	x	x		
Total (12)	10 (83%)	7 (58%)	2 (16%)	2 (16%)

Table 10 - Digital RPG Suggestions for Digital Media Courses

Majority (10 [83%]) of the suggestions provided by lecturers was to use digital RPGs as a platform to simulate real-world scenarios often encountered by industry practitioners. L3, who teaches video production classes, offered numerous examples on how digital RPGs could be used to simulate real-world tasks – one of which was about proper lighting setup for video shoots:

"Let's say cinematography – where we can place the lights. They would learn in this type of environment – say if it's dark, there's a window where do you place the lights – how would you use the rules of thirds to plan this shot, on a landscape like this, I want to do a close-up how would I frame this? Currently I show them a video that says this is how you apply the rule of thirds, where the character is placed on. They apply it but they are not as accurate." **[L3]**

The suggestion by L3 requires students to apply theoretical knowledge (rule of thirds, framing the shot) in practical settings. In addition, the location's conditions (dark scene, windows)

present students with an added challenge, as these variables will need to be factored in as students consider their responses towards the task. This aspect adds a layer of authenticity to students' learning experience. Like practitioners, students need to apply and adapt their knowledge according to changing conditions. As L3 described, the current method of showing videos to students was not entirely effective. Perhaps a similar task that simulates real-world scenarios could be designed for *Virtual Designer* for a more interactive and experiential learning experience for students.

On a similar note, L6 and L7 suggested using digital RPGs for students to perform design-related tasks, and in addition – present different outcomes as a form of feedback for students to gauge their performance:

"If for example, maybe the task is introduced, and then you kern it or do this task, and the boss really love you. Maybe that would be some sort of award to encourage them. And if you mess up, you end up working in a stupid agency with small salary and an ugly boss." **[L7]**

"The moment you come up with a stupid idea, the board or people you're pitching to will tell you it doesn't make sense. You can try to develop that and program this algorithm that gives you good feedback or what a good story is. A scenario for pitching." **[L6]**

Both lecturers spoke of scenarios with narrative elements, where students' in-game performance will dictate the positive and negative outcomes of the scenario. The inclusion of negative outcomes in particular adds believability to the scenario, enabling students to experience the negative consequences practitioners would face for failing at a task. These scenario outcomes are also a form feedback for students to gauge their performance, a refreshing change from formative and summative feedback students receive in traditional teaching methods (written feedback, quiz scores, critiques, etc.)

7 lecturers (58%) proposed the use of digital RPG as a means for students to experience role-playing as design practitioners in the industry, different digital media professions were suggested:

"…You are part of this company – skill improvement, higher technique, you are an intern then you become graphic designer, etc." **[L5]**

"So maybe in a RPG – you'll be the VFX supervisor, advising this director who doesn't know anything." **[L6]**

Interestingly, 2 references were made about *Mad Men*, a popular period drama television series depicting the professional and personal life of a fictional character in the field of advertising:

"I can see how you can use graphics within the games or the challenge of the games to make the students train their eyes as a designer – spotting a design problem. Maybe like a Mad Men, when you have a few advertising options and concepts, few design iterations…" **[L7]**

"…*Maybe a briefing or something like that – an imaginary environment – Mad Men – you're the man coming up with the idea – communicate that idea within the art department – then maybe one person in the art department has to respond to that idea. Or being able to select diff characters or roles – hopefully that could correspond to what we believe those typical roles within that real world environment."* **[L9]**

Lecturers L7 and L9 suggested possibly using the digital RPG to simulate a similar advertising firm environment, where students play roles similar to *Mad Men* characters (creative directors, designers, copywriters, etc.). L9's ending statement "***…hopefully that could correspond to what we believe those typical roles within that real world environment."*** suggests that the lecturer seeks to use digital RPG as a means for students

to explore and experience different practitioner roles. As discussed in Section 4.7.3.4, one of the identified learning challenges was students did not have an accurate or realistic view of industry roles, workflow and expectations. Having students role-play as practitioners in digital RPGs as L9 suggested may potentially help students overcome this learning challenge.

4.7.4.3 Concerns

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During discussions about feasibility and implementation of digital RPGs in classrooms, lecturers raised two main concerns. The first concern was the novelty effect (3 [25%]) students might experience from the appeal of using games for learning. L2 commented, "***"…there's going to be the first effect of excited – but the challenge to make the game still interesting semester after semester – when they know it, the novelty will be gone – what will attract them still?".***

The novelty effect has often been described in literature, in which game-based learning environments may initially entice students to be motivated and engaged, but that effect is often temporary, as such learning environments does not sustain student interest over a length of time (Blumenfeld et al. 2006). This novelty effect will be taken into consideration when designing in-game tasks of *Virtual Designer* and during data analysis in Study 2.

The second concern, raised by 2 lecturers (L7, L8) – were concerns about how learning outcomes achieved through digital RPG gameplay could be measured or quantified:

"For me it's definitely going to be a plus, an incentive, but then it could be just "I want to play a game" – how do you measure the outcomes?" **[L8]**

"The only thing is how you quantify it – this is good, this is bad, because creativity has different outcomes." **[L7]**

Both L7 and L8 raised a valid point. Subjectivity often comes into play in the field of digital media in regards to issues such as creativity, design, aesthetics, etc. To ensure proper evaluation is made on whether or not *Virtual Designer* is effective in achieving desirable learning outcomes, a mixed-method research approach was taken in Study 3. The pre/post-game tests will quantitatively measure if students achieved the desirable learning outcomes. In addition, students will also self-evaluate (pre/post-game surveys, focus group) to provide additional data. Combined quantitative and qualitative findings will provide an accurate measure to determine if the learning outcomes were successfully achieved through the game.

4.7.4.4 Lecturer's Involvement in Class

When asked about the level of involvement lecturers should take as students play the digital RPG, 8 lecturers (67%) responded that some forms of discussions should take place before or after students played the game in class. L9 suggested a pre-game briefing to provide students with a clear outline of exercises that will take place in the game: ***"Initially, one would set up the game to explain first of all as part of the assessment, exercise – to provide the knowledge in advance. "***

4 lecturers (33%) suggested spending some time on debriefing sessions after students have played the game:

"*At least if they have questions we can discuss in class, 30 minutes review. Or anything they have learned, challenges they had during the games."* [L1]

***"Step aside, let them play, but have a discussion later – facilitator can find out weaknesses of the students or celebrate successes."* [L4]**

On the level of involvement that should take place while students play the game, opinions were slightly mixed. 4 lecturers (33%) opined that lecturers should only play the role as a facilitator and refrain from disrupting students game-playing experience in class:

"RPG allows one to invest themselves into that game and explore, to suspend their disbelief and to do that properly I think, leave them alone. If the game is done well, you want to intervene as less as possible." **[L9]**

"I don't think the lecturer should be there at all. First is, I feel it's gonna delude the classroom environment. When you play an RPG you don't want a person right next to you. When you play games you want to have your own space." **[L7]**

On the contrary, 2 lecturers (16%) commented that lecturers take a more proactive approach whilst students play the game. L6 suggested that the lecturer could participate in the game environment as a player: ***"While they're playing it – I think ideally it would help if the teacher would be inside the game with them as another player."***

4.7.4.5 Lecturer's Involvement in Game Development

All lecturers (12 [100%]) believed that lecturers should be involved in the development process of the digital RPG for digital media courses. Lecturers (5 [42%]) believed that they should be involved in the game development process as subject-matter experts, to provide learning content and lesson materials that would inform the game design. Lecturers (5 [42%]) also believed that key to the success of using digital RPGs as a learning tool was to ensure the game objectives of the game are closely aligned with the intended learning outcomes of the course. L4 for example commented that learning outcomes are more essential over game aesthetics:

"At the end of the day no matter how ugly or beautiful the game is, it serves the purpose – which is to achieve the learning outcome. If it's beautiful but students don't learn anything for it defeats the purpose of the game." **[L4]**

L2 stressed that lecturers will be able to identify the desirable learning outcomes of the courses they teach, hence being able to use their knowledge to inform the game design, ensuring educational goals and objectives are well-embedded into the game: **"…Because**

you may not know the learning outcomes – the job is to give the learning outcomes and how to interpret it into the game."

4.8 Discussion

4.8.1 Research Questions Answered

The desirable learning outcomes, teaching challenges and learning challenges identified by lecturers are summarised in Table 11:

Desirable Learning Outcomes	Learning Challenges	Teaching Challenges
1.Theoretical Knowledge	1. Articulating Works	1. Engaging Students
2. Design Language	2. Applying Theories	2. Learner Attitude
3. Applying Knowledge	3. Conceptual Skills	
4. Conceptual Skills	4. Learner Attitude	
5. Soft Skills	5. Soft Skills	
6. Learning Skills	6. Theoretical Knowledge	

Table 11 - Summary of Desirable Learning Outcomes, Learning Challenges and Teaching Challenges of Digital Media Courses

The interview discussions with lecturers provided useful insights towards the secondary research questions (S1 and S2) Study 1 sought to answer:

S1: What characteristics of digital RPGs could be used for students to accomplish desirable learning outcomes and overcome learning challenges in digital media courses?

Reiterating findings presented in Section 4.7, the 3 biggest learning challenges students faced when studying digital media courses are: Articulating works using the design language, applying design theories and conceptual skills. Lecturers also find that the biggest teaching challenges were to engage students in class and dealing with students' attitude towards learning.

When prompted to identify useful features of digital RPGs that could be used to accomplish learning outcomes, lecturers believe that the interactive game environment in digital RPGs would be beneficial in situating students in completing design tasks in a variety of scenarios. These scenarios will simulate different variables, challenges and constraints that are often faced by digital media practitioners, which will prompt students to engage in creative problem solving by means of applying theoretical knowledge into practical work contexts. Some lecturers have also noted that narrative elements in some digital RPGs could be incorporated for digital media purposes, in which students' in-game performances will dynamically change the reactions of game characters or outcome of the scenarios, adding authenticity and believability towards the game experience. The ability of role-playing as different characters have also been observed as useful in having students experience playing the roles of practitioners of different specialisations in digital media. Finally, lecturers have also that using digital RPGs as an immersive form of learning may be feasible in circumventing the teaching challenge of students not being engaged in class due to lack of interest on the lesson materials and subject matter.

S2: How could learning outcomes of digital media courses be best supported through the use of digital RPGs?

According to lecturers, the 3 most desirable learning outcomes of digital media courses are: (1) gaining solid theoretical knowledge, (2) good proficiency in the design language and (3) ability to apply knowledge into different contexts and situations. Section 4.8.5 will elaborate

on how in-game tasks could be designed in digital RPGs to align with learning outcomes of digital media courses.

The next subsections will discuss a few additional considerations that were based on key issues raised from the interview discussions.

4.8.2 Theoretical Knowledge

Throughout the interview discussions, theoretical knowledge has been one of the topics that were recurrently mentioned by lecturers. Discussions revolved around the acquisition, retention and application of theoretical knowledge, with several lecturers stressing that solid theoretical understanding is one of the essential determining factors of the quality of students' creative outputs. Theoretical knowledge is evidently placed as top priority in the teaching of digital media courses. 67% of lecturers in this study considered solid theoretical knowledge as the most desirable learning outcome (Section 4.7.1.1). Lecturers lamented that students did not recognise the importance or relevance on how theoretical knowledge feeds into their creative practice, often prioritising on technical skills instead.

Despite this misplaced priority, lecturers did not consider theoretical understanding as a pressing learning challenge for students. It falls the lowest in the list of identified learning challenges (25%), with most lecturers agreeing that students have a fairly good understanding of design theories and principles that were taught through formal instruction in class. The striking issue however is students' inability to apply the same theories into practice (2^{nd} highest in the list of learning challenges), which incidentally is also one of the top desirable learning outcomes identified by lecturers:

Desirable Learning Outcomes	Learning Challenges	Teaching Challenges
1.Theoretical Knowledge	1. Articulating Works	1. Engaging Students
2. Design Language	2. Applying Theories	2. Learner Attitude
3. Applying Knowledge	3. Conceptual Skills	
4. Conceptual Skills	4. Learner Attitude	
5. Soft Skills	5. Soft Skills	
6. Learning Skills	6. Theoretical Knowledge	

Table 12 - Students did not struggle much with theoretical knowledge, but faced difficulties applying design theories into practice (one of the top desirable learning outcomes). Students also struggle with articulating works using the design vocabularies.

Two key issues were raised. The first is students' inability of applying theoretical knowledge into practice. According to lecturers, students were able to recall design theories and principles, but that level of theoretical understanding was not reflected in their creative outputs. This could be partially attributed to the misplaced priority previously discussed (students prioritising technical skills and not seeing the relevance on how theories would feed into their design practice). It is also indicative that students lacked meaningful understanding on the theoretical content acquired in class. As some lecturers observed (Section 4.7.2.2), students are passive learners in class, in which many are still transitioning from a high school learning environment – typically a more teacher-centered, sage-of-the-stage style of teaching. As such, students take a surface learning approach (Section 2.2.1) (Biggs and Tang 2011), depending on rote memorization and verbatim recall techniques without actually fully comprehending the learning content. Whilst students are able to regurgitate design theories and principles to demonstrate good understanding of theoretical knowledge - they struggle to proficiently apply that same knowledge into practical contexts effectively, as they have yet to

attain a deeper, meaningful understanding of the abstract knowledge to be able to apply it into practical tasks appropriately.

The second observed issue is students' poor ability in recognising patterns and relationships between theories to effectively accomplish tasks. Design tasks require students to not only recall prior knowledge – but also adapt or combine knowledge from different subject areas and apply it into different situations and contexts. Lecturers in Study 1 have used different teaching methodologies to help students overcome this hurdle, one of which was to present students with complex tasks that would require the combined use of prior knowledge. In the soundtrack exercise example (Section 4.7.1.3), to make a selection for a sound track of a movie clip, the sound design lecturer facilitated students through the process of recalling and adapting prior knowledge, guiding students to not merely pick a sound track – but also place considerations on narrative, cinematography, visual research and music genre before making their final selection. In doing so, the lecturer took an active questioning approach, asking students questions such as "*How did the bank look like?"* or *"What did you think about the character?"* before students arrive to the final solution for the task.

In another example (Section 4.7.1.1), the digital compositing lecturer directed students away from the technical aspects of the task (adding fire or smoke effects into video clips), but instead, posed questions to students – *"How do we make the film look less cheesy"*, *"How do we make it more cinematic?*" Whilst digital compositing is primarily a technical course, in completing the task (enhancing a movie clip in digital compositing software), students were given directions to recall prior knowledge in cinematography theory – lessons which they have learned from a video production course the previous semester. In doing so, the lecturer explicitly communicated how that theory would feed into practice in a digital compositing context, thus reinforcing students' understanding on how design theories and principles could be adapted across different contexts and settings.

In both examples, the lecturers applied an active learning approach from the constructivist view of learning (Section 2.2.4). Instead of relaying the information or learning content,

through inquiry techniques, both lecturers actively encouraged students to actively construct their own knowledge – recalling, adapting and combining prior knowledge to problem-solve the given task. As such, students learn to apply existing knowledge into different situations, achieving a more meaningful understanding on how theories could be applied into practical contexts. Through discussions with lecturers, it is apparent that theoretical knowledge isn't an issue, but rather, applying the knowledge and seeing relationships between theories presents a bigger challenge for students. As such, *Virtual Designer* will not be designed as an instructional tool for simple content delivery, but will function as a platform that is conducive for active learning. In-game tasks would be designed to encourage students to recall, adapt and combine prior knowledge, thus achieving meaningful understanding of how design theories fit into practical applications.

4.8.3 "You Should Speak Design."

"I say to them, you should learn the language, you should speak design. **[L5]**

Referring to design vocabularies (Section 4.7.1.2), lecturer L5 commented on how students failed to see the importance of speaking the "design language" – specialised design vocabularies and terminologies used by practitioners to critique and communicate their work in the field. Proficiency in speaking the design language was identified by lecturers as the second most desirable learning outcome. On a relevant note - lecturers find that the biggest learning challenge students faced in digital media courses was to articulate works using the design language.

Desirable Learning Outcomes	Learning Challenges	Teaching Challenges
1.Theoretical Knowledge	1. Articulating Works	1. Engaging Students
2. Design Language	2. Applying Theories	2. Learner Attitude
3. Applying Knowledge	3. Conceptual Skills	
4. Conceptual Skills	4. Learner Attitude	
5. Soft Skills	5. Soft Skills	
6. Learning Skills	6. Theoretical Knowledge	

Table 13 - Design Language is one of the key desirable learning outcomes. Students struggle with articulating their works effectively.

In Section 4.7.3.2, two lecturers observed that students were able to analyse and identify design theories and principles applied in other designers' works, but were unable to articulate works of their own using design vocabularies during critique discussions. This is partly attributed to students' lack of understanding in how the design language applies in specific contexts. As Gee (2006) described, in situations where students only understood a language at verbal level, words could simply be replaced with the associated definitions, however complex language use will not be possible as students lack the understanding on how that same language could be applied into specific situations and problems. In this case - students struggle to apply situative use of design language to articulate concepts and communicate design rationales of their creative outputs. This situated understanding of the language could be attained by means of interacting with other experienced users of the language and accumulating experience in using the language across different situations (Gee 2006). Classroom environments do not present students with sufficient opportunities in harnessing the design language. Unlike practitioners who use design vocabularies in work situations and interact with other experienced practitioners or clients; students interact with classmates (who themselves are new learners of the design language) and lecturers. The use of design

language is limited and situated towards the context of classrooms - applied in assignment write-ups, critique sessions and discussions with lecturers. By situating students in a simulated environment in digital RPGs, students may be exposed to more opportunities of using the design language in a workplace context, thus gaining familiarity and better proficiency on key vocabularies and terminologies of the design language.

4.8.4 The Classroom and The Real-World: Bridging the Disconnect

Lecturers discussed the disconnection between university education and the “real-world”, describing students’ lack of understanding in industry expectations, workflows and practices that they will be confronted with upon transitioning from the role of classroom learners to digital media practitioners. Discussions revealed how lecturers made adjustments towards teaching methodology and assessment designs in effort of drawing upon closer connections between the classroom and the real-world. In L6’s digital compositing course (Section 4.7.1.1), students were asked to imagine themselves as a film director, tasked with making a film more cinematic. In another example (Section 4.7.1.4), L3 emphasised that industry projects often require collaborative effort between practitioners and described how students were required to put aside differences and made to work in group-based projects. Soft skills were also mentioned as one of the desirable learning outcomes, with lecturers citing time management, communication, professionalism, etc. as key skills students must have to be able to perform well as practitioners in future. In these examples, lecturers simulated scenarios or conditions that practitioners would face in the industry within the classroom environment. Other initiatives, such as guest speaker talks and studio field trips were also organised to provide students with industry exposure. In addition, in students gain work experience through university internships and work placements towards the end of their education.

One of the learning challenges identified by lecturers was learner attitude (Section 4.7.3.4), with the view that students lacked an accurate understanding on real-world expectations of the field of digital media, often seeking instantaneous results without adhering to proper industry workflow and practices (development of concept and using theoretical knowledge to

inform design decisions). Although lecturers have taken different teaching approaches to draw closer connections between classroom learning and industry practice - reiterating Section 2.x, an authentic workplace experience is difficult to replicate within classroom environments.

Whilst students acquire the necessary knowledge and skills in classrooms, contextual differences exist between higher education and workplace settings. As such, practitioners apply the same knowledge and skills differently in the industry (Saunders and Machell 2000). Students perceive themselves as learners and their use of acquired knowledge is situated towards contexts within the classroom environment. Knowledge is received through lectures and tutorials, while practical skills are developed over time through structured exercises and assignments. Students present their works to their peers and lecturers, or participate in critique sessions in class. Contrastingly, practitioners apply their knowledge and skills into design projects with real-world constraints (such as time and budget constraints). Real-world design tasks are often not as well structured or well defined as university assignments, often requiring creative problem solving with the use of prior knowledge or the practitioner's accumulated experience. Instead of dealing with lecturers and peers - practitioners work with clients, employers and colleagues. Instead of submitting assignments to lecturers, practitioners complete real-world projects that satisfy client needs and requirements.

The situative perspective connotes that learning is a progressive process of applying knowledge into different situated activities and practices, which varies between contexts and cultures (Sawyer and Greeno 2009). As previously described, contextual differences exist between classroom and workplace settings, thus resulting in a gap between students' classroom learning experience with realities in the industry. Essentially, university experience should be indicative on expectations of the industry and adequately prepare students to transition from the roles of learners to practitioners (Saunders and Machell 2000). Grubb (1985) argued that work experience in classrooms could only be mimicked at best, in which authentic working experience could only be gained by engaging students with real-world tasks in real workplaces, such as internships and work placements. This view however

warrants further consideration, given the advancement of serious games and educational technologies to overcome barriers of teaching and learning. In the context of digital RPGs, the mechanics of role-play and non-linear narratives could be harnessed to situate students in a simulated workplace environment. In doing so, students are engaged in real-world tasks through the perspective of practitioners, attaining a meaningful understanding on how knowledge is applied to problem-solve real-world tasks in different hypothetical scenarios (Harasim 2012).

4.8.5 Digital RPGs for Digital Media Courses

The consensus of lecturers in Study 1 about the feasibility of digital RPGs as learning tools for digital media courses were generally positive. Several lecturers believed that digital RPGs could be implemented in class, with lecturers taking the role of facilitator and moderator in post-game briefings. Lecturers cautioned on the possible novelty effect students may experience from the initial enjoyment of playing games and stressed that game objectives should be aligned with educational objectives. This could be achieved by involving lecturers as subject matter experts to provide the necessary learning content and define learning outcomes that would inform the overall game design.

The lecturers provided interesting suggestions on how digital RPGs could be designed to fit into their teaching of digital media courses (Section 4.7.4.2). Majority of the lecturers (83%) made recommendations that the game be used to situate students in simulated scenarios to perform real-world tasks as practitioners of different digital media specialisations. For example, presenting a design concept to clients in a boardroom as a graphic designer, planning the logistics for a film shoot as a video producer, framing and capturing photographs in different lighting conditions as a photographer. As previously described, authentic work experiences are difficult to replicate within the confines of the classroom. Situating students in different hypothetical scenarios through digital RPGs would enable students to apply their knowledge into simulated workplace environments, which would otherwise be difficult to achieve through traditional teaching approaches. Given that students role-play as practitioners of different specialisations, knowledge could be applied into different scenarios

with a shift of context, in which students solve problems from the practitioner's perspective, thus attaining a more meaningful understanding on how knowledge is applied into a real-world context.

Lecturers also suggested using the non-linear narrative in digital RPGs to dynamically provide feedback to students as they play the game - for instance, the mood of the manager changes based on in-game performance, or a poor performance will result in a negative outcome of the scenario. Unlike the typical forms of summative feedback lecturers have described using in digital media courses (milestones, process documents, critique feedback), incorporating dynamic positive and negative feedback in scenarios adds a touch of authenticity and believability in the game-play, in which students will experience real-world consequences within the game, thus gaining a better understanding on industry expectations and practices.

4.9 Summary

This chapter has presented the data collection methods, procedures and findings of Study 1. Through interview discussions, lecturers have highlighted and provided insights on the key desirable learning outcomes, learning challenges and teaching challenges of digital media courses. Findings from Study 1 will be taken into consideration in the overall game design and instructional design of *Virtual Designer*. Chapter 5 will present the an overview of *Virtual Designer's* game development approach and design considerations involved in producing the game, along with a descriptive walkthrough of the range of features and in-game tasks embedded within the game.

5 Design and Development of *Virtual Designer*

5.1 Introduction

Informed by findings from lecturers' interview responses in Study 1 (Chapter 4) – a 3d digital RPG, *Virtual Designer*, was developed. This game will be implemented in digital media classes to investigate its overall effectiveness in helping students accomplish learning outcomes of digital media courses. While the use of digital RPGs as an educational technology tool have spanned across a range of discipline areas at different educational levels (grade school, high school, university or workplace training), the scope of this research focuses on the use of digital RPGs for courses of a Digital Media undergraduate program. This decision of using digital media courses as the focus of this study spurred from the reviews of past literature, which indicated that little research has been conducted on the use of digital RPGs for this discipline area in higher education learning. As described in Chapter 3, two core courses of the digital media program were selected for this study: **Design for Digital Media 1 (DDM 1)** and **Design for Digital Media 2 (DDM 2)**. Lecturers provided input and course content to ensure game objectives were well aligned with the desirable learning outcomes of digital media courses that were identified in Study 1 (Chapter 4) and official university course guides. Upon completion of development, *Virtual Designer* was play-tested by digital media students and lecturers in Study 2 (Chapter 6) and Study 3 (Chapter 7).

This chapter begins with a discussion on how *Virtual Designer* would be situated as a bridging tool for digital media students to reinforce and subsequently apply theoretical knowledge into practice in three learning phases. The chapter then reiterates key desirable learning outcomes identified by lecturers in Study 1 and university course guides. This is followed with the presentation of a conceptual framework on how game characteristics and selected Bloom's Taxonomy categories could be implemented into the game design of digital RPG to achieve desirable learning outcomes, and how this conceptual framework was applied into the design of *Virtual Designer* to adequately meet game and educational

objectives. This is followed with an overview of *Virtual Designer's* game development approach and design considerations involved. This chapter continues with a descriptive walkthrough of features and scenarios embedded within the game.

5.2 How Digital RPG Fits as Bridging Tool in Digital Media

This section provides an overview of the three phases of learning for digital media courses and how *Virtual Designer* would fit as a bridging tool between that connects the learning phase of acquiring knowledge, to the final learning phase of applying knowledge.

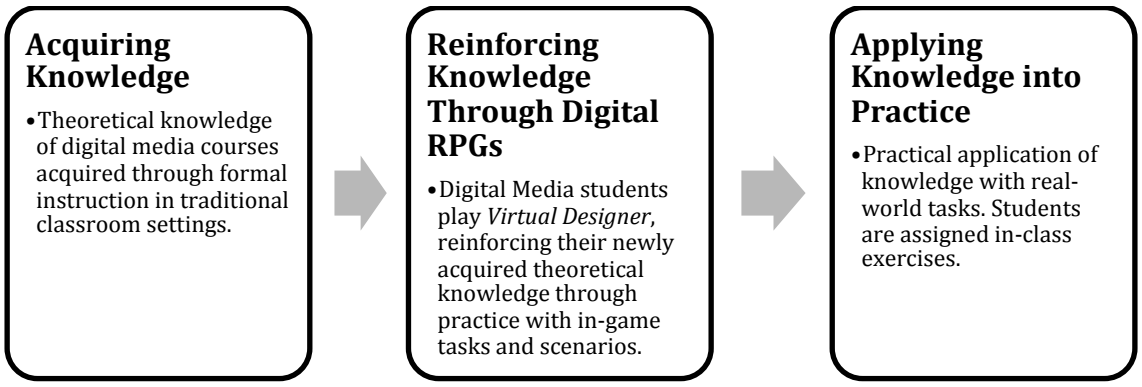

Figure 9 - Situating Digital RPGs as a Bridging Tool for Digital Media Courses.

Learning Phase 1: Acquiring Knowledge

In a digital media course, students begin their learning journey by acquiring knowledge through various sources, such as face-to-face lectures, textbooks and Internet resources, etc. During this phase, students are introduced to a diverse range of abstract concepts, theories, terminologies and approaches to produce digital media outputs. A solid theoretical knowledge in design is essential for students to gain a fundamental understanding of what constitutes as good design, as this will have critical influence during the creative decision-making process, enabling students to produce digital media outputs that are effective and aesthetically pleasing.

During lecture sessions, students are presented with learning materials in the forms of static images, audio and video. These different forms of media are used as visual aids to illustrate abstract concepts and theories of design. Lectures are often interactive and active learning is highly encouraged, as students are required to participate in discussions and offer critique of design examples presented in class. This encourages students to communicate using the "*language*" of design and gain confidence in harnessing the use of design vocabularies and terminologies, which are commonly used by design practitioners in the field. However, during interview discussions in Study 1 (Section 4.7.2.2), digital media lecturers described students as being passive learners and were often reluctant to participate or engage in discussion. Students also struggle to articulate and explain their own works during critique sessions.

Learning Phase 2: Reinforcing and Applying Knowledge Through Digital RPGs

The next phase of learning involves a process of reinforcing students' understanding of newly acquired knowledge. Given the nature of the digital media discipline, students are required to recognise the relevance and inter-relationship of different design theories and how these theories would apply in the conceptualisation process to produce digital media outputs that are visually compelling with good conceptual depth. This necessitates the need of reinforcing knowledge - to provide effective means for students to practice applying newly acquired theoretical knowledge in different situations until they achieve desirable proficiency and confidence in using the knowledge in practical contexts.

Typical measures used in digital media classes to reinforce knowledge require students to work on lab exercises under the facilitation and guidance of lecturers. However, as lecturers in Study 1 described (Section 4.8.2), students are often not adept in recognising relationships between theories from different courses to adapt and apply combined knowledge into complex tasks. Although students are able to demonstrate good knowledge in design theories, the understanding on the abstract knowledge was at surface level, as students struggle to apply the same theories into practice. In helping students attain meaningful

understanding on how design theories is used in practice, the classroom learning experience needs to be situated in an authentic setting which simulates real-world expectations of the discipline of digital media. Newmann et al. (1996) described that such authenticity in classroom learning could be accomplished by establishing meaningful connections to the real world by requiring students to transform knowledge and apply it into practice within the discipline. *Virtual Designer* will be embedded with educational objectives for digital media students to actively practice applying their knowledge in a diverse range of hypothetical scenarios that practitioners often face, adding to their proficiency and versatility in adapting theoretical knowledge into different practical situations within a real-world context - an experience that is often difficult to replicate within the confines of a classroom.

It is imperative to note that the intention of the game is not to substitute existing classroom practices of teaching and learning, as such – *Virtual Designer* was not designed as a didactic learning tool for students to study the course content. The game assumes prior knowledge (acquired from classroom teaching) and would be a platform for students to reinforce and apply theoretical knowledge into different situations, serving as a bridging tool between the acquisition of knowledge and its application into real-world design practices.

Learning Phase 3: Applying Knowledge into Practice

Upon gaining proficiency in applying newly acquired knowledge through practice in different hypothetical situations, students will progress into the third phase of learning, which would require them to apply both theoretical knowledge and practical skills to execute real-world tasks. In this study, under the guidance and facilitation of the lecturer – upon playing *Virtual Designer*, students will be tasked with in-class assessments. At this stage, students transition from playing *Virtual Designer* to discuss and work on design tasks in a physical setting. A debriefing will be conducted in class to discuss students' overall game-playing experience, as well as review on the learning content embedded within the game. This step is essential in the field of creative design, as the face-to-face interaction of students with their lecturer and peers, executing real-world design tasks and communicating using the design language are

key in creating a strong sense of community of practice within the classroom – an experience that could not be emulated by solely interacting within a digital environment. Given that *Virtual Designer* will serve as a bridging tool, the game itself will not be used as an evaluative tool to determine students' ability of knowledge transferal. Rather, this study will evaluate students' ability through summative assessment, which will assess if students are able to translate that theoretical knowledge and apply it into practical tasks within a real-world setting.

5.3 Aligning *Virtual Designer* with Desirable Learning Outcomes

5.3.1 Learning Outcomes

Desirable learning outcomes identified by digital media lecturers in Study 1 (Chapter 4) were used to inform the instructional design of *Virtual Designer*. In addition, learning outcomes outlined in official university course guides of both courses (DDM1 and DDM2) were also reviewed. This ensures that the game objectives were mapped with key desirable learning outcomes from both lecturers' and university's perspectives.

5.3.1.1 Desirable Learning Outcomes - Study 1 Findings (Lecturer Interviews)

As described in Section 4.7.1, lecturers perceived the following as the most desirable learning outcomes for digital media courses:

Solid Theoretical Knowledge

The most desirable learning outcome was for students to gain solid theoretical knowledge in digital media courses. Lecturers have emphasised the importance on how having a firm grasp of theoretical knowledge was an essential part of the design process, in which high quality creative outputs are often produced through thoughtful design considerations informed by appropriate theories of design.

Proficiency in Speaking the Design Language

The second desirable learning outcome identified by lecturers was for students to be well versed in the use of the vocabularies and terminologies of design. Like digital media practitioners, students should demonstrate excellent skills in articulating, communicating and critiquing digital media outputs using the language of design.

Applying Knowledge

Students should recognise relationships and patterns between concepts and theories from learned different subjects areas and develop an understanding on how this knowledge applies in a real-world and practical context. Students should be familiar with the common industry workflow and processes and make effort in applying theoretical knowledge into their digital media outputs instead of over-prioritising on only practical or software skills.

Other Learning Outcomes

Students should acquire soft-skills that are essential for design practitioners, such as collaboration, time management and communication skills. Lecturers have also expressed that students should be interested in the subject during teaching delivery and motivated to be independent learners and be self-sufficient enough to expand their knowledge and skills on their own accord outside of classrooms.

5.3.1.2 Desirable Learning Outcomes – University Course Guides

In preparation of course materials and assessment designs, lecturers refer to the university course guides, which outlines course objective, descriptions and learning outcomes of each course. Table 14 presents the course descriptions and learning outcomes of DDM1 and DDM2's university course guides.

	Design for Digital Media 1 (DDM 1)	Design for Digital Media 2 (DDM 2)
Course Description	This course is an introduction to contemporary digital design for different audiences. The creative development and production process will be a focus of the course, including the development of creative responses to a range of digital design problems. You will also develop design ideas and applications for digital and non-digital media, through exploring principles of design such as colour, form, space and typography and applying them to your practice.	In this course you will extend your knowledge of design theory. The role of creative practice will also be explored within the design process, including the ways in which different specialists collaborate to produce digital content. You will examine the interrelationships of visual and written communication for the creation of digital media content and artefacts, for diverse audiences and applications. You will also develop digital media ideas through an iterative process from concept to full realisation.
Learning Outcomes	• Discuss contemporary ideas in design theory and practice and visual communication in different cultural contexts. • Analyse and apply design theory and principles to develop concepts for digital design problems. • Apply theories of colour and visual communication to your digital designs for a range of audiences. • Critique and create digital works using the principles and elements of design and typography.	• Explain how creativity is embedded in the design process and how this is informed by design theory. • Apply concepts and digital design techniques in composition, typography and imaging to the development of digital media content for print, packaging, screen, and mobile. • Apply the design process (research, create, produce and evaluate) to the development of creative responses to design briefs. • Create digital media solutions, integrating visual and written communication for different cultural contexts. • Evaluate and discuss your creative decisions and how you apply design principles to your projects.

Table 14 - Course Description and Learning Outcomes of Design for Digital Media 1 and Design for Digital Media 2

Based on comparisons between DDM1 and DDM2, the overlapping learning outcomes between both courses could be summarised as below:

1. To understand design theories and principles, applying it with design techniques to produce creative digital media outputs.

2. To discuss, critique and articulate digital media works and ideas using knowledge in design theories.

3. To understand and apply the design process, from concept to completion.

These learning outcomes bears similarity with desirable learning outcomes identified by lecturers in Study 1 – to gain solid theoretical knowledge, to be proficient in speaking the design language, to competently apply knowledge into real-world and practical contexts. In achieving the learning outcomes outlined above – transferal of knowledge is key. How could students recognise and understand relationships between acquired theoretical knowledge from different courses, enabling them to proficiently communicate and apply these abstract theories into practical contexts through a proper design workflow, from concept to completion? This study proposes the use of a digital RPG (*Virtual* Designer) to bridge this transferal process as a platform to reinforce and practice students' theoretical knowledge in different hypothetical situations, to gain familiarity and confidence in applying and communicating design theories within real-world contexts.

5.3.2 Input-Process-Outcome Game Model

The input-process-outcome game model (Garris et al. 2002) (Figure 10) was applied as the basis of how *Virtual Designer* fits into students' learning journey to accomplish learning outcomes. The game-playing cycle (user judgments, user behavior, system feedback) is informed by instructional content and game characteristics (input) to achieve learning outcomes (outcome). In the context

of this study, the input objective involves the use of instructional content of Design for Digital Media 1 (DDM1) and Design for Digital Media 2 (DDM2). Lesson materials in the forms of lecture slides, class exercises, media examples and assessment tasks were used as content references to inform the overall instructional design of game tasks and scenarios in *Virtual Designer*.

Figure 10 - Input-process-outcome game model (Garris et al., 2002).

Garris et al. (2002) concluded that game characteristics could be described as 6 dimensions: fantasy, rules/goals, sensory stimuli, challenge, mystery and control. Given that these dimensions provide a standardised set of vocabularies to realign core elements of games for instructional purposes, all 6 dimensions were embedded into the game design of *Virtual Designer* in alignment with selected Bloom's taxonomy categories to accomplish desirable learning outcomes. These game characteristics will be presented as a part of the conceptual framework presented in Section 5.3.3.

Adapting the Input-process-outcome game model, both forms of input (instructional content and game characteristics) embedded within *Virtual Designer* triggers a process of what Garris et al. (2002) describe as a game cycle, in which students will engage in active participation in making judgments and performing behaviors within the game. The game thus responds with different

modes of feedback, enabling students to gauge their in-game performance. The game cycle could repeat itself if necessary, where students may make multiple iterations of attempts, continuously receiving feedback and improving their responses until an increased level of proficiency or knowledge is achieved through the game cycle. This transcends into the final outcome phase, in which a debriefing is involved before the learning outcomes are achieved. Notably, 33% of lecturers in Study 1 (Section 4.7.4.4) have expressed that debriefing should take place after students have played the game in class, where the related learning content could be reviewed as a means to reinforce knowledge – and discussions held for students to share their overall game-playing experiences, allowing lecturers to identify student weaknesses that needs further improvement, or celebrate successes in class.

5.3.3 Designing Digital RPG to Achieve Learning Outcomes: The Conceptual Framework

A conceptual framework (Figure 11) was developed as a conceptual model on how digital RPGs could be designed to meet educational objectives and achieve desirable learning outcomes. Although this conceptual framework was used to design *Virtual Designer* and accomplish learning outcomes of digital media courses (DDM1 and DDM2), it is a generalised framework that could also be used by game designers and educators to design or repurpose digital RPGs for courses in discipline areas that require students to achieve a firm grasp of theoretical knowledge, to be able to competently apply theoretical knowledge into practical contexts, and to be proficient in speaking the language of the domain of their specialisations, like the practitioners do.

In discussions with lecturers during Study 1, one of the concerns raised by lecturers was the issue of novelty of the game, in which the game has an element of fun but does not provide enough educational value towards students' learning. Other lecturers have stressed that the game should not be designed as a boring educational e-learning tool and should be engaging to sustain student interest in a longer term. As such, while the digital RPG needs to be engaging

and fun to play, it is imperative that the designed tasks and game mechanics are aligned with the necessary educational objectives, so learning outcomes could be successfully achieved.

As presented in Figure 11, the design of the digital RPG is informed by Garris et al.'s (2002) game characteristics and selected categories from Bloom's Taxonomy's cognitive, psychomotor and affective domains. The game characteristics define the overall game objectives of the digital RPG, informing the design of in-game tasks and mechanics that are embedded into the game. In parallel, all in-game tasks and mechanics in the conceptual framework are linked with Bloom's taxonomy categories. Bloom's Taxonomy was used as a guide of determining educational objectives within the game, as it has been widely accepted method used by educators to organise different levels of expertise and measurable learning outcomes to make suitable selections of assessments for courses (Brissenden and Slater 2007).

Tasks or game mechanics that are not strongly related with both game and educational objectives was not included into the conceptual framework. This cross-linking between game characteristics and Bloom's taxonomy categories ensures that both game objectives and educational objectives are adequately met in the overarching game design of the digital RPG.

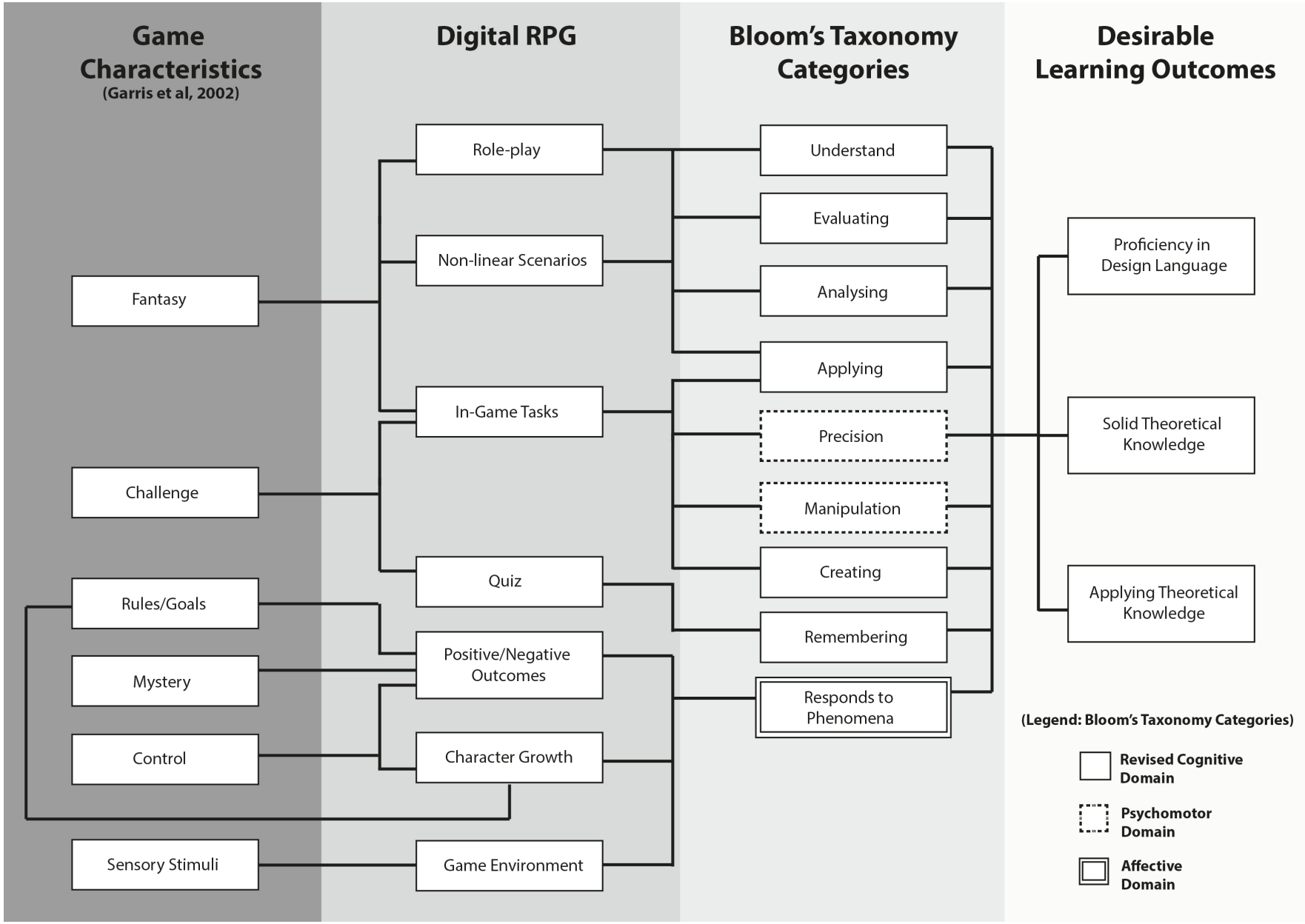

Figure 11 – Conceptual Framework: Aligning Game Characteristics with Bloom's Taxonomy Categories in Digital RPG to Accomplish Desirable Learning Outcomes.

5.3.4 Linking Game Characteristics to Digital RPG

The conceptual framework involves 6 game characteristics outlined by Garris et al. (2002): Fantasy, challenge, rules/goals, mystery, sensory stimuli and control, which were aligned with digital RPG characteristics, mechanics and attributes that demonstrate strong relationships with relevant categories of Bloom's Taxonomy.

5.3.4.1 Fantasy

The findings from Study 1 (Section 4.8.4) indicated that there is a disconnection between university education and the "real-world". Workplace contexts are hard to be replicated within classroom environments, thus making it difficult for students to experience or understand industry expectations, workflow and practices. Van Staalduinen (2010) referred to fantasy as "*The make-believe aspects of the game, environment, scenarios (narrative), the role(s) of the player, nonplayer characters (game agents) that can be interacted with."* The element of fantasy in games creates an environment where players are able to experience "real-world processes" through different perspectives (Garris et al. 2002; Malone and Lepper 1987). The characteristic of digital RPG to role-play as fictional characters, experience different scenarios (often with some narrative element) and perform in-game tasks aligns with the fantasy game characteristic. Within the game environment of *Virtual Designer*, this combined use of role-play, scenarios and tasks situates students in an imaginary workplace context, where students identify as design practitioners and actively solve problems or perform tasks in simulated real-world scenarios.

5.3.4.2 Challenge

Challenges in games could be achieved by progressive increase in level of difficulty, multiple clearly defined goals and some level of ambiguity in tasks (van Staalduinen 2011; Garris et al. 2002). Van Staalduinen (2011) noted that challenges add the element of fun and competition, where students need to overcome different levels of barriers to achieve game objectives. Accompanied with ample feedback, such progressive change of challenge dynamically changes

as students progress through their learning. In *Virtual Designer*, the Challenge game characteristic is formally applied into in-game tasks and quiz. The in-game tasks are situated within the main scenarios, where the tasks provided are often presented in a conversational manner and not definitively defined. As such, students will need to analyse and consider the design theories that are applicable for the scenario's problems and questions. This requires a recall of prior knowledge, along with adaptation of knowledge into the specific situation. Although some of the challenges embedded in *Virtual Designer* were difficult, all scenarios and tasks vary in terms of difficulty level. Given the games' non-linear structure, students are also able to dictate the sequence of scenarios they would attempt, gaining control in their learning (see Section 5.3.4.5 – Control).

5.3.4.3 Rules/Goals

In *Virtual Designer*, the goal in each scenario is for students to provide accurate responses that lead to positive outcomes. The outcomes are a form of feedback that is indicative to students on whether the goal was successfully achieved. For added motivation, a character growth mechanics was incorporated, in which player's character will receive or lose experience points based on performance. Continuous good performance throughout the game will lead to promotions or demotions of the character's job title (from intern to art director), serving as an informal goal to increase student's effort and performance towards in-game tasks and scenarios.

5.3.4.4 Mystery

To stimulate curiosity in students' learning, elements of mystery could be added into the game. Garris et al. (2002) noted that the situating activities in fictional scenarios would enable students to achieve meaningful understanding on how knowledge would be applied in the real world. Depending on student performance, all the main scenarios in *Virtual Designer* will lead to different cut-scenes as an informal form of feedback for students to gauge their performance (a score is also provided at the end of the scenario). The questions posed by characters are very

conversational (as opposed to a strict question and answer format), which dynamically changes throughout the scenario in response to the answers provided by students. The final outcome of each scenario mimic real-world consequences, for instance, failing to perform well in a boardroom scenario will lead with dissatisfied clients in the end. This element of uncertainty, revealed only after students have completed the full scenario, stimulates student curiosity to engage with the task or scenario until the final cutscene is revealed in the end. As Salen and Zimmerman (2004) described, uncertainty is a necessary quality to create a meaningful play experience. It is also a narrative concept where an element of mystery is added into the game, creating a dramatic sense of conflict.

5.3.4.5 Control

Control refers to the ability of the user to manage or control activities within the game and make decisions that affect/effect outcome, which increases student motivation in learning (Garris et al., 2002). In *Virtual Designer,* students are given control over changing scenario outcomes and character growth. As discussed in Section 5.3.4.4, the scenario outcomes are directly influenced by student responses and overall performance in completing the task. The conversational style characters in the cut-scene dynamically changes depending on students' responses. This form of feedback differs from the typical quiz-based approach - whereby students answer all the questions and receive a numbered score in the end, as students are given a sense of control in the turn of conversation (through their responses) as the scenario is being played out. On a broader perspective, students are given control in *Virtual Designer* in their learning. Scenarios could be played in any sequence and students may select scenarios based on their knowledge level in the subject area. All tasks and scenarios could be reattempted at any point of time for continued improvement and further reinforcement of knowledge. This form of control provides students with the flexibility in planning their learning at a self-controlled pace.

5.3.4.6 Sensory Stimuli

The game environment is set in an interactive 3d environment, mimicking a design studio setting. A 3d environment was created for *Virtual Designer* as opposed to a 2d environment, to increase realism and believability in the game playing experience, creating a stronger acceptance of the fantasy set up (location, theme, role play) by players (Van Staalduinen 2011). In addition to an interactive game environment, the characters in all main scenarios were modeled and animated with good believability, with additional time spent on animating the facial expressions and voice recording. Given that the character responses dynamically changes as students play out the scenarios, it is imperative that subtle feedback is provided through seamless shifting of characters' facial expression and tone of voice, to increase the believability and immersion while students play the scenarios.

5.3.5 Bloom's Taxonomy Categories for *Virtual Designer*

The game design of *Virtual Designer* will be aligned with selected categories of Bloom's Taxonomy. Bloom's Taxonomy was selected for this framework, as it is the one of the most established ways to organise different levels of expertise and measureable learning outcomes. In doing so, appropriate classroom activities or assessments could be selected and used in courses (Bloom et al. 1994, Gronlund 1991, Krathwohl et al. 1973).

Harnessing the digital RPG game characteristics outlined in Section 5.3.4, *Virtual Designer* seeks to address all of Bloom's Taxonomy categories in the revised cognitive domain, and selected categories of the psychomotor and affective domain. *Virtual Designer* was designed to enable students to identify connections between design theories and principles, to proficiently communicate and apply these theories into practical settings, addressing the desirable learning outcomes identified in Study 1 and university course guides (Section 5.2). The game was intended to serve as a supplementary learning platform to be used alongside existing modes of teaching and learning (formal classroom deliveries, in-class assignments, hands on exercises,

presentations, etc.) within a blended learning environment. To perform well in the game, students need to recall and apply acquired knowledge from prior lessons in class.

It is imperative to note that the presented conceptual framework (Figure 11) have included all of Bloom's taxonomy categories of the revised cognitive domain. However, only 2 categories from the psychomotor domain and 1 category from the affective domain were used in the conceptual framework. The exclusion of some categories from the conceptual framework was due to consideration that some outcomes in Bloom's Taxonomy categories, such as valuing or characterization (affective domain) could best be accomplished through face-to-face interaction within the physical classroom space, rather than within the game space itself. As *Virtual Designer* is intended to be used as a supplementary tool within a blended learning environment (combining the use of educational technology alongside face-to-face teaching and interaction), instead of attempting to shoehorn all of Bloom's Taxonomy categories into the conceptual framework, only relevant categories that best aligned with digital RPG characteristics were included.

Table 15, 16 and 17 presents the selected Bloom's Taxonomy categories in the conceptual framework, along with descriptions on how *Virtual Designer* aligns with these categories.

Table 15 - Virtual Designer - Alignment with Revised Cognitive Domain (Adapted from Anderson et al. 2001)

Table 16 - *Virtual Designer* – Alignment with Psychomotor Domain (Adapted from Dave 1975)

Table 17 - *Virtual Designer* – Alignment with Affective Domain (Adapted from Krathwohl, Bloom, Masia 1973)

5.4 Designing Virtual Designer

5.4.1 Author's Contribution in Developing *Virtual Designer*

Virtual Designer was developed over a 6 months timeline by two small development teams. The first team, based in Vietnam, was responsible in modelling and animating characters for the cut scenes. The second team, based in England, was responsible in the overall game programming. As this author is an experienced digital media lecturer and practitioner, she acts as subject matter expert for the learning content and also played a huge role as game designer and artist of *Virtual Designer*. She was heavily involved in the production of the game from concept to completion. Her contributions in the game development are as follows:

- **Game concept** – Planned and designed *Virtual Designer's* entire game concept. A game design document was produced and distributed to both teams (animation and programming) prior to the game development.

- **Game design** – Designed the rules of the game and decided on all game mechanics embedded in *Virtual Designer*, while ensuring the game stays true to its intended educational goals that were informed by learning outcomes identified by lecturers in Study 1.

- **Instructional design** – Based on lesson materials provided by lecturers of DDM1 and DDM2, this author designed all scenarios, in-game tasks and questions/answers. She wrote the script, branching stories and outcomes for the main scenarios.

- **Concept sketches, storyboard and character design** – Produced all concept sketches and storyboard for the game as blueprint references for the animation team. Also designed the user interface of the game.

- **Cut-scenes –** Directed cut-scenes and supervised the work-in-progress of all shots. The animators in Vietnam are students of this author's 3d animation class and received guidance and direction in creating the cut-scenes from concept to completion.

- **Game Environment and User interface** – Designed the overall game environment and layout, as well as user interface and navigational structure within the game.

5.4.2 Preliminary Game Design Considerations

Interview feedback collected from lecturers in Study 1 (Chapter 4) was used to identify desirable learning outcomes of digital media courses. These learning outcomes, along with official course

guides, lesson plans and course materials were used to inform the instructional design and game design of *Virtual Designer.* One of the early considerations was whether to follow the common practice of customising an existing COTS (Commercial-Off-The-Shelf) game, or to develop an entirely new game from scratch. As de Freitas and Jarvis (2006) opined, opting to customise COTS may not be ideal at times, as such games may not be designed for specific contexts, target learners and suitable model of pedagogy. As such, rather than using an existing COTS (Commercial-Off-The-Shelf) game, *Virtual Designer* was developed from the ground up from concept to completion. This has significantly increased the game development timeline and costs, but enabled full control in customising and adding specific game functionalities that are tailored for digital media education needs. Based on lecturer feedback and suggestions, the game was tailored for digital media courses in its entirety, containing mechanics and features that lecturers consider as essential or feasible to achieve the desirable learning outcomes.

5.4.3 Game Environment, Visual Look and Feel

As the aim of *Virtual Designer* is to provide players with an immersive simulated studio working experience, it was essential to ensure high fidelity in the visual look and feel for added realism and believability in the game experience. As such, the game was built entirely in 3d mode. Opting for a 3d game as opposed to a more simplistic 2d style game significantly increased the game development timeline – however, it enabled not only a more engaging and believable game environment, but also provided players with more refined controls in navigating the space with their avatars through 3rd person view. The main scenario also features 3d cut scenes with alternative endings, based on player's performance in the task. Social interactions between playable or non-playable characters should be authentic and believable to create an immersive environment (de Freitas and Maharg 2011). As such, voice actors were hired for all the NPCs (Non-playable characters), which speak to players in a very conversational manner to explain tasks or provide feedback, providing a more natural and convincing interaction experience with the characters of the game.

Prior to starting the game, players are able to customise and name their avatar characters through the character creation screen.

Figure 12 - Players could customise and name their avatar character in the character creation screen.

Upon completion of avatar creation, players are taken to a studio lobby scene, in which a dialogue box appears, providing information of keyboard. Controls of the game are briefed and demonstrated by lecturers in class before the game was played, to ensure students are able to navigate the character and initiate interactions within the game with ease.

Figure 13 - A dialogue box appears at the beginning of the game, providing a quick guide on keyboard controls to navigate through the game.

Upon familiarising with the keyboard controls in the studio lobby area, players may proceed to the main studio environment. There are some NPCs available in around the studio – initiating conversations with some of the characters in the main studio scene will trigger the Side-Missions. There are several closed doors in the office – opening these doors will begin the Main scenarios, which are different scenarios that tests player's knowledge in a range of design theories. All scenarios are accessible anytime and at any sequence at the player's discretion. In the event of an unsatisfactory performance, players may reattempt the scenario again at a later time. In addition to main scenarios, there is a Library room available, which grants players access to brief lesson materials of key design concepts and vocabularies that are tested in scenarios within *Virtual Designer*.

Figure 14 - The game environment features a design studio, where players interact with NPCs (Non-Playable Characters) to initiate brief conversations.

5.4.4 Main Scenarios and Side-Missions

The game consisted of 3 main scenarios and 2 side missions. Table 18 presents the change objectives, along with the associated learning and game mechanics implemented in each scenario and side-scenario.

Change Objectives	Learning Mechanics	Game Mechanics
Main Scenario 1: Printing Error **Employer needing help with print-proofing. Player is asked to identify and fix all errors of a poster design before it gets sent out for mass printing.** Performance Objective: - Analyze, identify and troubleshoot design errors using combined knowledge of printing and typography.	- Action/Task - Identification - Observation - Analyse - Simulation - Responsibility - Feedback - Incentive	- Role play - Cut Scenes - Questions and answers - Selecting - Realism - Simulate/Response - Rewards and Penalties - Feedback

- To demonstrate knowledge of design vocabularies and it's context of use in real-world. Attitude: To be more attentive and meticulous in print-proofing, as careless errors will result in costly consequences. Knowledge: - Printing - Typography		
Main Scenario 2: Colour Theory **Storyline of colleague needing to change colour scheme of a design packaging. Player changes colour scheme at the request of NPC by using their knowledge on colour theory.** Performance Objective: - To demonstrate knowledge of colour theory and associated colour terminologies. Attitude: To establish context of how comprehension of colour theory is essential in real-world design practices. Knowledge: - Colour theory	- Action/Task - Question and answers - Simulation - Responsibility - Feedback - Incentive - Motivation	- Role play - Cut Scenes - Questions and answers - Selecting - Realism - Simulate/Response - Rewards and Penalties - Feedback
Main Scenario 3: The Boardroom **Storyline of employer needing player's help to pitch a logo design to clients. Player provided a concept document to review, player pitches to clients.** Performance Objective: - To present and justify design idea, concept and rationale to clients using knowledge of design	- Discuss - Question and answers - Simulation - Responsibility - Feedback - Incentive - Motivation	- Role play - Cut Scenes - Questions and answers - Selecting - Realism - Simulate/Response - Rewards and Penalties - Feedback

theories. - To demonstrate familiarity of design vocabularies. Attitude: To understand pitching as part of an essential process in design. Knowledge: - Colour theory - Logo design - Typography - Communicating ideas, presenting work		
Side-Scenario 1: Client Inquiries **Client calls player to inquire about printing and book binding options. Player needs to give proper advise/information based on knowledge on printing and book binding types.** Performance Objective: To accurately handle client inquiries using existing knowledge on print and book binding. Attitude: To establish context of how comprehension of printing and binding types is essential in real-world design practices. Knowledge: - Printing - Binding - Communicating with clients	- Discuss - Question and answers - Simulation - Responsibility - Feedback - Incentive	- Questions and answers - Simulate/Response - Rewards and Penalties - Feedback - Role play
Side-Scenario 2: Quiz **Simple quiz – answer as many design related questions as possible within 30 seconds. Players can attempt this challenge as many times as they wish.**	- Question and answers - Feedback - Incentive	- Questions and answers - Rewards and Penalties - Feedback

Performance Objective: To demonstrate comprehension of different design theories. Knowledge: - Printing - Binding - Typography - Design elements - Principles of design		

Table 18 - Performance Objectives and Associated Change and Game Mechanics of Scenarios and Side-Missions in *Virtual* Designer.

5.4.5 Main Scenarios

The 3 main scenarios of *Virtual Designer* situate players in different hypothetical scenarios typically encountered by design practitioners in the real world. Players may decide when to attempt each scenario, or re-attempt a scenario anytime to achieve a favorable score. Cut-scenes are played, with NPCs explaining the task at hand or providing responses as a form of on-going feedback of players' performance. Depending on how well players performed, the outcome of the scenario will play out differently at the end. For instance, clients in Main Scenario 3 may be delighted with a logo design, or appear unhappy in the event player failed to pitch a logo design successfully.

In some instances, non-linearity is incorporated into the main scenarios. Like the scenario outcomes, the series of on-going questions and responses of NPCs differs based on players' response. Answering a question correctly in Main Scenario 2, for example, will lead to the NPC probing further with additional follow-up questions, requiring players to justify the reasoning of selecting that answer. This non-linear attribute embedded within *Virtual* Designer provides a richer experience to player and the non-predictability of NPC responses further elevates the level of difficulty. Attempting main scenarios require good knowledge of design theories – principles of design, elements of design, colour theory, printing theory, typography and branding identity. The performance objective of each scenario varies, ranging from simple recall of design

term definitions to analysing and explaining a design, or applying design theory into practical situations. The following sections will provide detailed walkthroughs of each main scenario and side mission.

5.4.5.1 Main Scenario 1: Preflight a Poster

Main Scenario 1 is set within the office of a design team supervisor. Upon entering the room, a cut-scene begins and an NPC (non-playable character) expresses that help is required to preflight a poster. The character, a supervisor, stressed that there were no margin for errors, as the document would be sent for mass printing. As such, mishandling this task would be a costly mistake. The term “preflight” is used in the design industry to describe a standard workflow of ensuring that digital files are properly set up and formatted before being submitted for printing. Some of the steps involved in preflighting would include:

- Ensuring correct colour format of image files (RGB or CMYK).
- Ensuring print marks - such crop marks, fold marks, colour bars, tint bars, registration marks, etc. are placed in the correct positions.
- Ensuring document size, margins and bleeds are correct and in accordance with specifications required by clients.
- Ensuring fonts and images are viewable in the file, or embedded and converted into paths.
- Ensuring the document and images are set at a resolution ideal for printing.

Upon explaining the task objective, players are asked to confirm if they wish to proceed with the scenario. Players lacking confidence in the area of print preflighting may opt to exit the scenario at this point. A library section is accessible in the main game area, which allows players to have a quick review of preflighting before returning to attempt Main Scenario 1 at a later time.

If a player chooses to proceed with the scenario, an event poster appears. A set of selection options are made available, consisting of options to select different the bleed, margin, registration points, crop marks, colour bars and tint bars. Choosing each option switches the

positioning or appearance of the print elements on the poster. In addition, there is a scale to increase or decrease the DPI setting of the document. Players are required to cycle through the options to select accurate placements and adjustments of print elements, before finalising their answers and clicking the “SEND TO PRINT” button.

Figure 15 - Players are required to change the settings on screen to indicate accurate positioning and setting of print elements and specification, before confirming the answers and sending it for print.

Upon confirming the answers, a cut-scene plays, revealing the outcome of the scenario. There are three possible outcomes, depending on how well the player performed the task. A high score (preflight was 100% correct) would result in a positive reaction from the character, where he notifies the player that the posters came back from the printer and it turned out perfect. Scoring between 50-80% would result in the second outcome, in which the character appears slightly displeased with some of the errors made, further reminding players that the preflighting should have been done more carefully before sending the document for printing. As for poor in-game performance (score of 50 and below), the character appears upset that the poster came back full of errors, further reprimanding the player: “*Now we have 5000 copies of posters that*

we cannot use! You just cost us a lot of money. I'm sorry - but I'm going to have to let you go."; indicating that the player is fired from the company for making this costly error. The scenario concludes at this point and a score sheet appears, summarising player's overall performance in Main Scenario 1. If players failed to perform the scenario well, they may review printing theory basics from the in-game Library section, and reattempt the scenario at a later time.

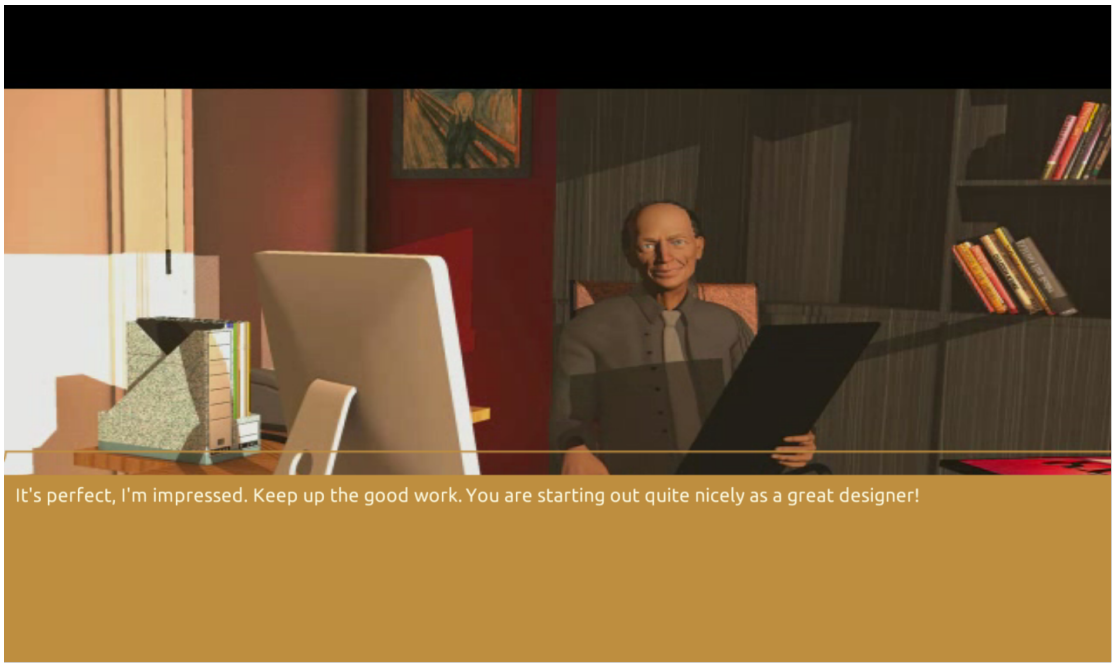

Figure 16 - An excellent performance in Main Scenario 1 results with a positive reaction from the supervisor, conveying that he is pleased with the player's good performance in executing the task.

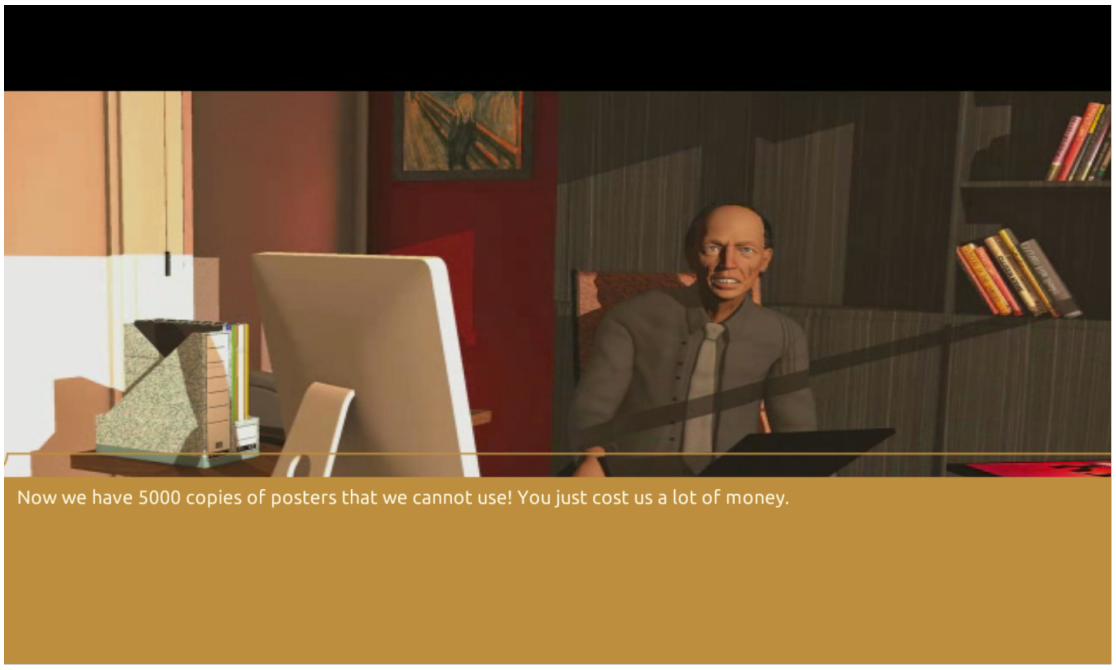

Figure 17 - An unsatisfactory performance in Main Scenario 1 results with an upset reaction from the supervisor, explaining the costly consequence of making errors in preflighting.

To perform well in this scenario, players need to identify different print elements – crop marks, registration marks, colour bars, tint bars, bleeds and margins; and more importantly - fully comprehend the purpose of each print element. For instance, crop marks are used as visual indicators for printer service providers to know where to trim a document. Bleed marks are areas of printing that extends beyond the original print size before trimming – the area to be trimmed off. As such, the standard procedure during preflight is to place crop marks above bleed areas.

A mistake commonly made by students in design practice is wrongly placing crop marks onto margin areas within their design documents or setting bleed areas incorrectly - resulting with errors in the final prints. These common errors are often stemmed from students' lack of understanding of the difference between bleed areas, margin areas, crop marks, and the purpose of these printing elements. The same would apply in the context of *Virtual Designer* - without an in-depth knowledge of printing theory, students will face difficulties of setting up the print elements correctly in Main Scenario 1.

In designing this scenario, considerations were made on two key learning outcomes outlined in the official university course guides of Design for Digital Media 1 and Design for Digital Media 2:

1. Analyse and apply design theory and principles to develop concepts for digital design problems. (Learning outcome for Design for Digital Media 1)

2. Apply concepts and digital design techniques in composition, typography and imaging to the development of digital media content for print, packaging, screen and mobile. (Learning outcome for Design for Digital Media 2)

Learning outcome 2 described a core skill that students should gain upon completion of Design for Digital Media 2 - the ability to apply concepts and digital design techniques into digital media content. As print was one of the digital media content listed in the learning outcome, the topic on printing theory was selected as the learning content for Main Scenario 1. The performance objective of this scenario requires students to analyse, identify and troubleshoot errors using their knowledge of printing theory. Using theoretical print knowledge acquired from class lectures and reading materials, students apply that knowledge into practice – setting the print elements correctly on a poster design.

5.4.5.2 Main Scenario 2: Colour Scheme

Main Scenario 2 is set in a scenario where a colleague requests assistance from players in colour selections for a packaging design she created for a client.

Figure 18 - Main Scenario 2 - A colleague requires assistance in preparing alternative colour schemes for a packaging design she made.

A common part of the workflow in packaging design is to producing a different range of colour schemes for selection before finalisation of the design. “Colour scheme”, in the context of colour theory, refers to specific combinations of colours on the colour wheel. To be well-versed in colour schemes, students first need to comprehend the concept of a colour wheel – a circular diagram which visually represents a range of colour hues, in accordance to its chromatic relationship. The colour wheel serves as a tool to visualise relationships between colours and determine colour schemes, based on positioning of colours on the colour wheel.

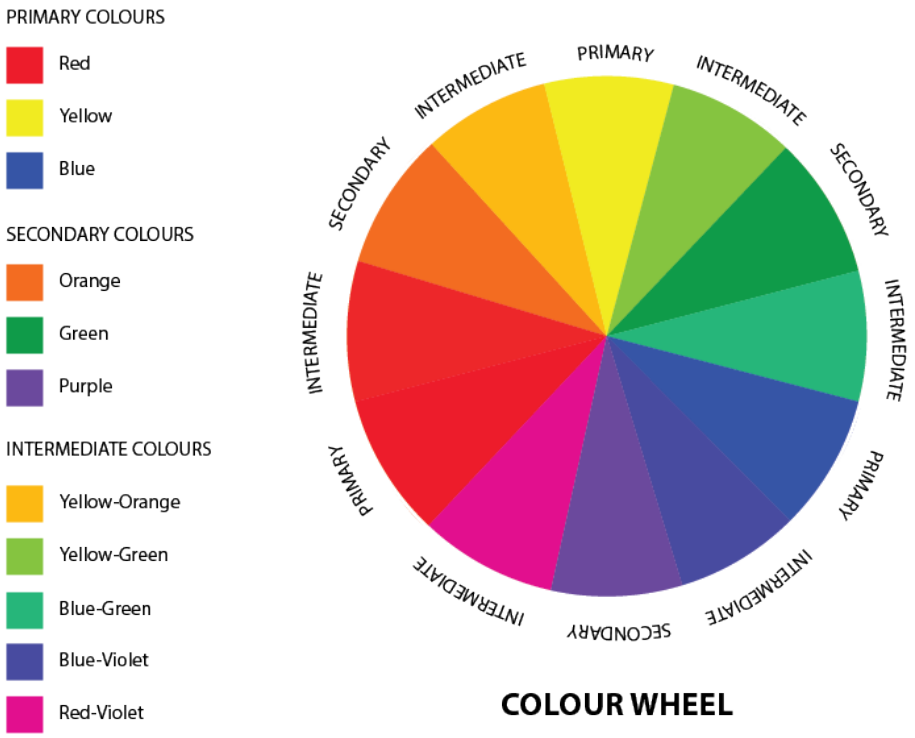

Figure 19 - A colour wheel indicating the positions of primary, secondary and intermediate colours. Colour schemes could be determined using a colour wheel. This image is provided in the Library section for players that require a quick review of colour theory.

For example, the *analogous* colour scheme refers to colours that are positioned adjacent to each other on the colour wheel, while a *complementary* colour scheme refers to colours that are opposite each other on the colour wheel. Different colour schemes provide different visual impact towards a design. Colours in *analogous* colour schemes tend to be more harmonious than colours from the *complementary* colour scheme. On the contrary - the colours of *complementary* colour schemes provide stronger contrast, which enhances visual interest in a design. As such, it is essential for designers to have good knowledge of different colour schemes to make educated use of colour choices when producing digital media content in practice.

Upon agreeing to assist the NPC, the character calls the player over to the computer to help tweak the colour schemes. She proceeds to explain that the player would tweak the colour

schemes for her on the computer, while she decides which colour schemes to opt for.

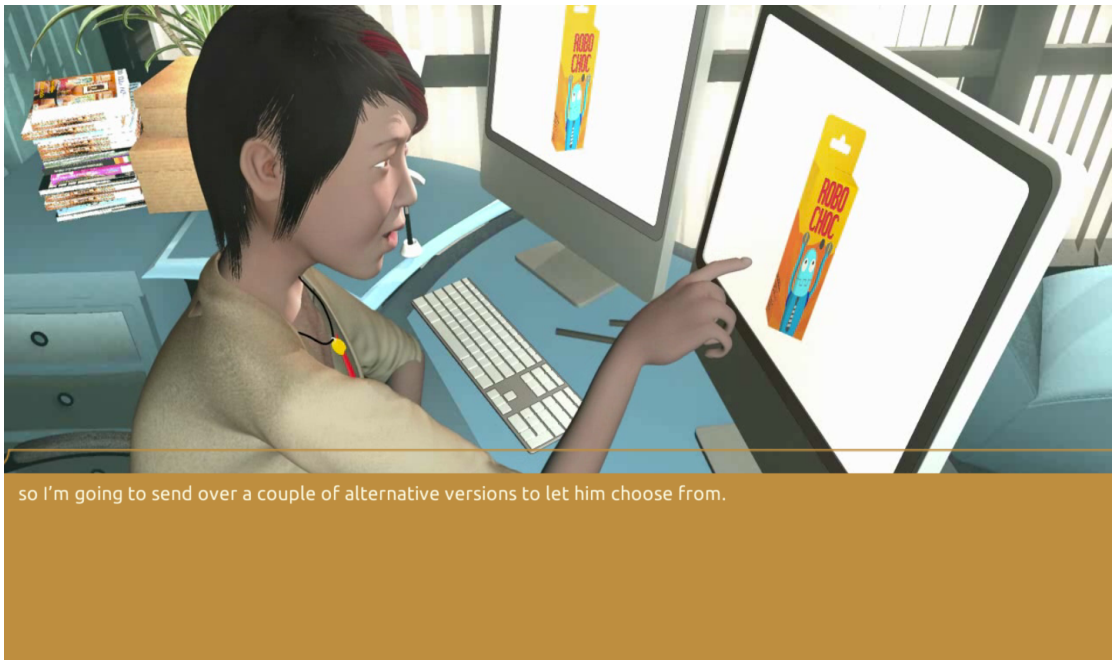

Figure 20 - The character explains the task objective in Main Scenario 2's cutscene – to select alternative colour schemes of a packaging design.

Players are asked a series of questions related to colour theory, at varying degrees of difficulty. The first question asks players to select intermediate and secondary colours off a colour wheel. This is a fairly basic question and requires a simple memory recall of which are the intermediate/secondary colours on a standard colour wheel.

In another question, the players are presented with a close-up image of the packaging design's logo and asked: *"…does the logo look ok to you?"*. In this instance, players are given 5 choices to respond, ranging from *"Looks fine to me!"* to 4 other observations of possible problems, such as poor saturation of colour, the logo needs to be scaled up further, etc. Design vocabularies were used in the answer selections, such legibility, contrast, visual impact and saturation. Players need to observe the image, identify the problem - and have a fair understanding of design language and colour theory to make a correct answer selection.

Figure 21 - In this screenshot, players are presented with an image and asked to identify any possible problems with the logo. Design vocabularies were used in answer selections.

In this example, selecting the correct answer (*"The logo text and its background seem to lack contrast."*) would lead to a follow up question, asking players to explain why an adjustment of the contrast would help:

Question: The contrast?

Answer 1: Of course. Boosting the contrast would enable better unity in the design.

Answer 2: Yeah. Increasing the contrast would improve readability of the texts. (Correct Answer)

Answer 3: Certainly. Added contrast would make the logo abstraction look so much clearer.

Answer 4: Yup. The increased contrast would bring stronger continuity to the logo design.

Answer 5: Sure. If we increased the contrast, the font legibility would work so much better.

All 5 answers incorporated design vocabularies associated with different topics of design, such as colour theory, typography (*legibility, readability)*, logo design (*abstraction*) and principles of design (*unity, continuity*). As such, answering this question requires more than surface-level knowledge, as players need to consider both colour theory and typography at a deeper level -

and determine how the logo text would benefit from an adjustment in the contrast. If players make the correct answer selection (Answer 2 – increasing contrast would improve the readability of texts) - players will then be asked to apply adjust the value of the logo text until a suitable colour contrast is achieved. In doing so, players apply theoretical knowledge of colour theory into practice.

A series of questions in Main Scenario 2 require players to identify and make appropriate choices for different colour schemes. The character would name a colour scheme - "*Now let's try out different colour schemes. Shall we? How about analogous scheme?*". An analogous colour scheme refers to colours that are adjacent to each other on the colour wheel. Players may click on a "Toggle Wheel" button to reveal a colour wheel as a visual aid to determine which colour combinations would make an analogous colour scheme. Players may then proceed with browsing through the selection of packaging in varied range of colour combinations, before identifying which packaging is using the analogous colour scheme.

Figure 22 - In this screenshot, players are asked to select a split-complementary colour scheme. Clicking on the left or right arrows changes the colour combinations used on the packaging design. A toggle wheel button is available if players need a colour wheel as a visual aid to answer the question.

Some non-linear questions were also included in Main Scenario 2, in which the follow-up questions changes based on players' responses. In one instance, upon choosing a correct answer ("split-complementary"), the character prompts players with a follow-up question:

Character: Hold on, you sure that's a split-complementary scheme?

Answer 1 – 100% positive! (Correct answer)
Answer 2 – To be honest, I took a wild guess and hoped for the best. Let me try this again. (Wrong answer)

Players are given the option to reconsider their previous answer. If player confirms that the answer was correct, yet another follow-up question was asked, with the character doubting the given answer:

Character: No, no……..I'm sure that's incorrect. The split-complementary scheme is when four colours are arranged into two complementary pairs.

Answer 1 - *Oh yeah, you're right. Let me try this again. (Wrong answer)*
Answer 2 - You are mistaken. (Correct answer)

At this point, players could once again reconsider and change the answer – or insist that the character was wrong. If players selected Answer 2 (*"You are mistaken."*) - The character then asks for clarification.

Character - What do you mean I'm mistaken? I'm pretty sure split-complementary scheme is when four colours are two pairs of complementary colours! Hence, it's called the *split* complementary.

Answer 1 - That's the Monochromatic scheme. (Wrong answer)
Answer 2 - That's the Tetradic scheme. (Correct answer)
Answer 3 - That's the Triadic scheme. (Wrong answer)
Answer 4 - That's the Complementary colour scheme. (Wrong answer)
Answer 5 - That's the Analogous scheme. (Wrong answer)

Choosing Answer 2 cues the cut-scene, with the character admitting her earlier error and providing players a positive feedback:

Character: Wait - let me refresh my memory…. *pauses a while, in deep thought* Oh yeah! You're right! Wow. You're really GOOD. I've got all the colour schemes mixed up. See what coffee overdose does to you???

Essentially, these "red-herring" questions were included to assess players' colour theory knowledge at a deeper level.

5.4.5.3 Main Scenario 3: Pitching a Logo Design

Main Scenario 3 is a set in a pitching scenario. At the start of the scenario, an NPC relays that he needed the player's assistance in pitching a logo design to clients. Players are required to carefully read a design brief and select the best logo design (out of 3 provided), which aligns closest with the specifications outlined by clients in the design brief.

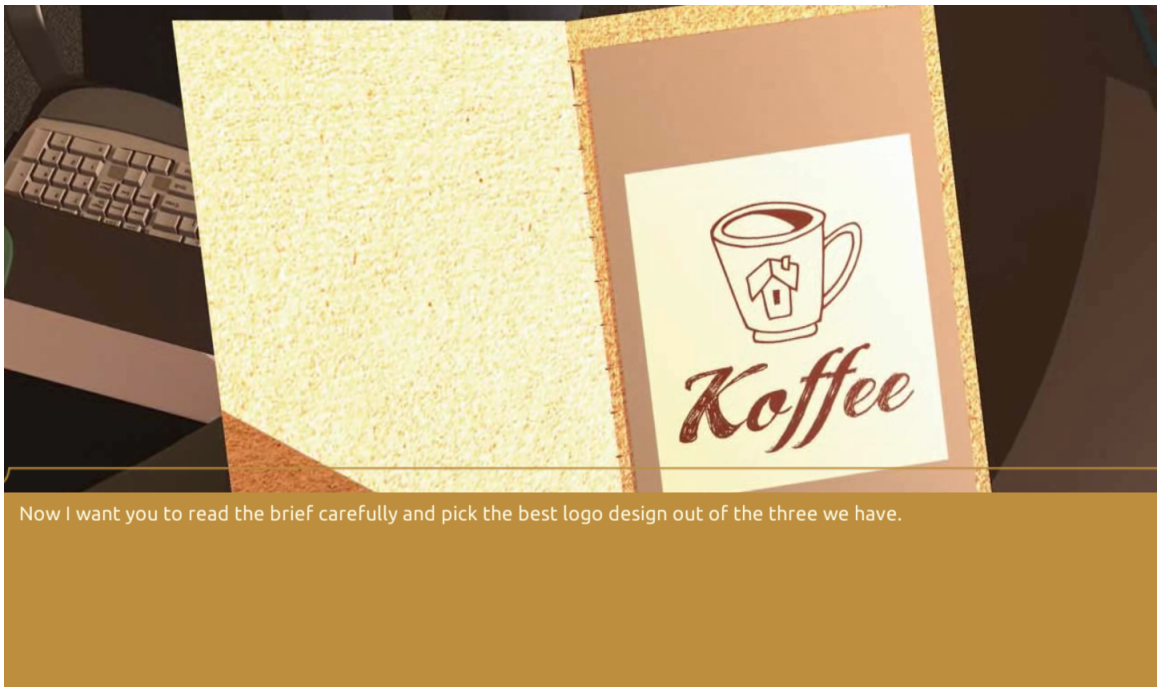

Figure 23 - A design brief is provided and players are asked to pick the best logo design (out of 3 selections) which best aligns with specifications outlined in the brief.

Upon confirming the logo selection, the scene changes to a boardroom with 2 waiting clients. Players will now need to pitch the selected logo design to clients successfully and answer all their inquiries to justify the suitability of the design as logo for their new café business.

Figure 24 - Players are required to pitch a logo to two clients in a boardroom and respond to client inquiries about the design.

The clients will be presented with the logo design, which was selected by the player in the previous scene. The clients' reaction varies based on the selected logo. If the ideal logo was selected, the clients immediately appear impressed, with one of the character adding, "*Oh, that's an interesting design! Could you explain the concept further?*" On the contrary, clients appear displeased if presented with a poor logo design choice, "*Hmm… we are not too sure about this design. It just doesn't seem to fit with the requirements we described a few weeks ago. Could you explain the concept further?*"

Figure 25 - The scene displaying the logo before the pitching begins. If the ideal logo design was chosen, the clients will appear impressed with the design. A poor selection will result in clients expressing doubts about the design as the pitch begins.

The scenario proceeds with both clients querying about design aspects of the selected logo, such as the logo's concept, typeface used, printing concerns, scalability etc. Like before, the questions and responses of both NPCs vary based on the logo design selection. For instance, if Logo 1 were selected, the client would point out the excessive number of colours used in the design and express printing cost concerns. In another example, choosing Logo 3, a text-based logo, would result with the client expressing that there is no visual hint present in the logo to indicate that provides instant recognition that it represents a café business – an essential requirement, which was outlined in the design brief. Like Main Scenario 1 and Main Scenario 2, the questions and responses contained constant uses of design vocabularies from different theories of design. To answer these questions correctly, a good knowledge of design theories is required, such as typography, printing theory, logo design and brand identity.

The series of questions would lead to the conclusion of the scenario, displaying 1 of 3 possible outcomes in a cutscene. An excellent performance will result with very pleased clients, expressing that they are happy with the logo design that was pitched to them. A poor

performance would result with both clients rejecting the design, saying, "*We were quite disappointed with the presentation. I hope your studio is taking our logo design seriously, because we are quite unimpressed thus far. Anyway, we will speak with your boss tomorrow.*"

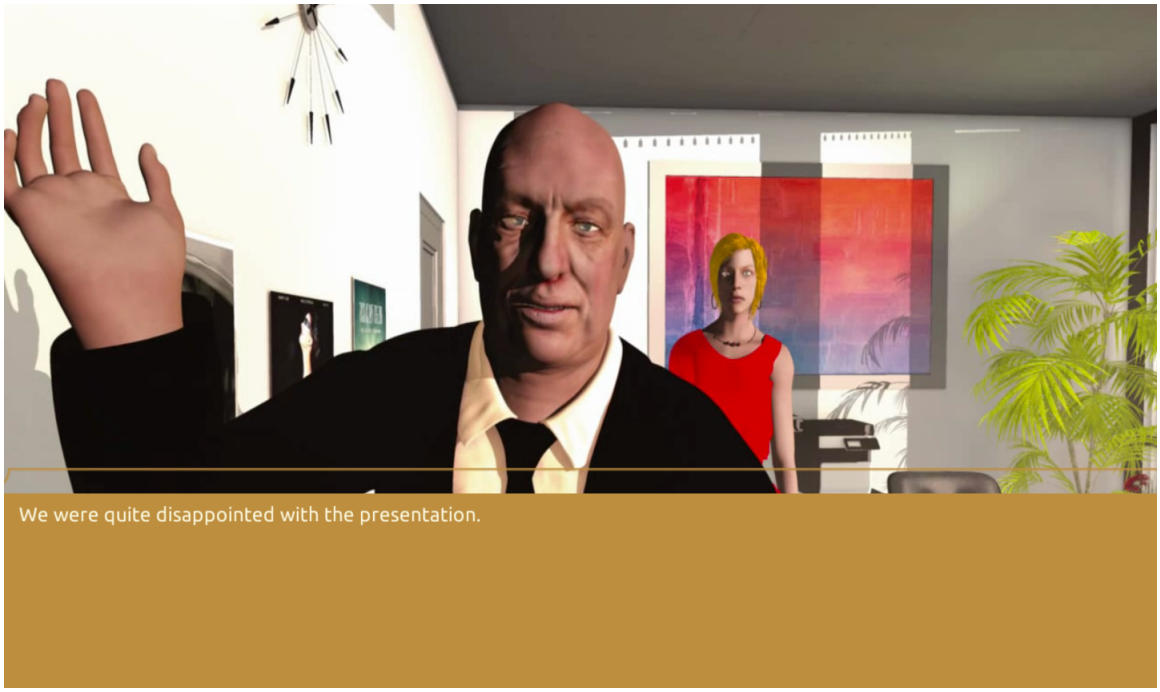

Figure 26 - Clients appear unimpressed with the presentation if the player's performance in Main Scenario 3 was unsatisfactory.

5.4.6 Side-Missions

In addition to Main scenarios, two Side-Missions are accessible in the main studio area. Players could approach an NPC to initiate a conversation and begin the scenario.

Figure 27 - Players may navigate through the studio and approach NPCs to initiate a conversation and begin Side-Missions.

Side-Scenario 1 is set up in a quiz format, which tests players' knowledge in a range of design theories. Players may attempt Side-Scenario 1 multiple times. The questions sets are different in each attempt, hence enabling players to continuously self-assess their design theory knowledge in different areas.

Side-Scenario 2 involve a conversation between the player and a client on the phone. The client is sending some documents for a printing job and had some inquiries about printing formats and paper types. Similar with Main Scenario 1 (preflighting a poster), an extensive knowledge in the area of print theory is required to answer the inquiries correctly.

5.4.7 Library

A library section is available if players wish to do a quick review of design theories covered in Main scenarios and Side-Missions of *Virtual Designer*. Visual examples are also available and explanations are provided on key concepts and design vocabularies of different topics of

design. Players are referred to the library if their in-game performance was unsatisfactory during main scenarios.

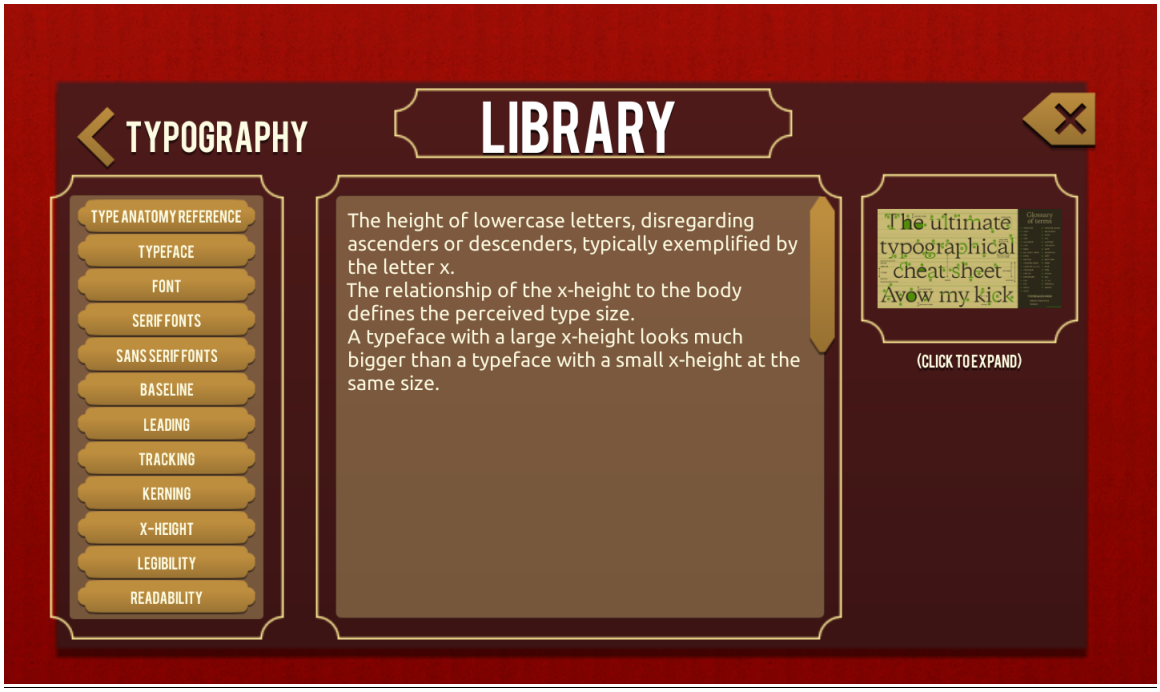

Figure 28 - The Library section provides information about key concepts or terms for design theories, enabling students to do quick review before attempting in-game tasks.

5.4.8 Scoring System and "Leveling Up"

As described in the previous sections, players receive feedback about their performance by positive and negative responses from NPCs (non-playable characters). Upon completion of each scenario, a Scenario Complete notification will be displayed in the end, indicating the Grade (A, B or C) and total score players have achieved in that scenario.

Figure 29 - A score summary appears upon completion each Main scenario, with a grade of A, B, or C. Players' performance will increase or decrease XP points, indicated by the blue bar at the top of the screen. Filling in the blue bar leads to promotion to a higher position.

Virtual Designer uses the "levelling up" game mechanic that is commonly used in RPGs. Achieving a score between 50-100% would result with an increase of Experience Points (XP), indicated by a blue bar at the top of the screen. Players accumulate XP by completing different scenarios successfully. When the XP fills up, players will level up and be rewarded with a promotion (for instance – from intern to junior art director). Likewise, scoring below 50% decreases player's XP. A continuous poor performance entails a demotion. Players may reattempt scenarios multiple times to improve their performance and increase Experience Points.

In addition to individual scoring display and levelling up after completing each scenario, a score summary could be generated at the end of the game, which displays a detailed breakdown of player's overall game performance, providing information such as score of each scenario (how many questions were answered correctly and incorrectly), total time spent on the game, number of attempts in each scenario, etc. The score summary could be exported from the game as a

PDF file, which could be used as a report for lecturers to determine students' level of knowledge in different topics of design theory.

5.5 Summary

Chapter 5 presented a conceptual framework of digital RPG design that is aligned with game characteristics and Bloom's Taxonomy categories to accomplish desirable learning outcomes of digital media courses. This conceptual framework could be used as a generalised framework for undergraduate courses in other discipline areas that are practice-based, where students would benefit from having a digital learning platform that would enable them to reinforce and apply theoretical knowledge into practical real-world contexts. Using this conceptual framework, *Virtual Designer* was developed as proof-of-concept, in which the game design and educational objectives were tailored for 2 digital media courses to accomplish desirable learning outcomes identified by lecturers in Study 1 and formal university course guides. *Virtual Designer* will be play-tested by students and lecturers. Qualitative and quantitative data will be collected to measure students' performance improvement after playing the game, as well as overall lecturer and student perception on the feasibility and effectiveness of using digital RPG to accomplish desirable learning outcomes.

Chapter 6 will present results and findings of Study 2, which evaluated the impact of *Virtual Designer* in students' learning. Students will play-test *Virtual Designer* in a classroom setting and complete pre/post-test, surveys and participate in focus group to provide a comprehensive feedback about the game.

6 Study 2: Evaluating the Impact of Virtual Designer (Students)

6.1 Introduction

This chapter presents the research procedure, data analysis and research findings of Study 2, where digital media students play-tested *Virtual Designer* in classroom settings to provide quantitative and qualitative feedback on the game's overall effectiveness as a learning tool to accomplish desirable learning outcomes of digital media courses.

As previously described (Section 3.4.2), Study 2 focuses on investigating students' perception of challenges they face when learning within classroom settings, their feedback of *Virtual Designer* and the feasibility of using digital RPGs as a supplementary educational technology tool to accomplish learning outcomes. A mixed-methods research approach was taken in this research phase, with the use of 3 different data instruments to collect quantitative and qualitative data: pre-test and post-tests, opinion-based surveys and a focus group interview. The analysis of statistical data with descriptive qualitative feedback would contribute to findings, which addresses the following secondary research questions:

Could digital RPGs be implemented in classrooms as an effective learning tool for students to accomplish learning outcomes of digital media courses?

Which types of learning outcomes in digital media courses could best be supported through digital RPGs?

What features or elements of digital RPGs could be used for students to accomplish desirable learning outcomes and overcome learning challenges in digital media courses?

The chapter will begin with a walkthrough on research procedures involved in implementing Study 1. Results from data collection will be reported and subsequent findings will be discussed in Section 6.5.

6.2 Pre-Test/Post-Tests

6.2.1 Research Procedure

Study 2 involved the participation of 1st year undergraduate students in the Bachelor of Design (Digital Media) program. The experiment was conducted on both Vietnam and Australia campuses during Semester 2 of 2015. Participants in Vietnam consisted of students enrolled in Design for Digital Media 1 (DDM 1) and Design for Digital Media 2 (DDM 2). At the Australian campus, all student participants were all enrolled in DDM2, as DDM1 was not offered on that campus during that semester. Each course consisted of 2 groups. As convenience sampling was used, intact class groups were used, in which the assignment of students into respective class groups was dependent on students' own enrolment choices before the semester began. For the experiment, each class group was assigned as the control group and treatment group.

Course Name | Campus Location	Control Groups	Treatment Groups
Design for Digital Media 1 (Vietnam)	31	45
Design for Digital Media 2 (Vietnam)	30	39
Design for Digital Media 2 (Australia)	16	17
Total	77	101

Table 19 - Sample Size Summary

Lecturers of DDM 1 and DDM 2 delivered lessons of design theories in both control and treatment groups through face-to-face lectures. In each course, lessons were delivered by the same lecturer (1 lecturer for DDM1 Vietnam, 1 lecturer for DDM2 Vietnam, 1 lecturer for DDM1

Australia) with the use of identical lesson materials - presentation slides, in class demonstrations and tutorials; ensuring consistency in teaching delivery.

With permission from university administrators, the experiment was conducted on scheduled tutorial hours in computer laboratories where classes were usually held. At the beginning of class, students were briefed about the premise of the study and notified that pre/post-test scores collected will not be calculated towards their course grades. Students of both control and treatment groups completed an informed consent form, Survey Sheet 1 (pre-game opinion-based survey) and pre-test (consisting of theory and practical components).

In the control group, upon completing Survey Sheet 1, students were instructed to review previous lessons materials on design theories, which were taught by lecturers in face-to-face classes during previous weeks of the semester. The lesson materials was accessed through the university learning management system, Blackboard and consisted primarily of presentation slides used by lecturers during previous classes. Upon spending 30 minutes to review lesson materials, the lecturer conducted a review with students on key terms of colour theory, print preflighting and typography. Using an active questioning approach, lecturers prompted students with questions and encouraged students to participate by responding with appropriate answers. Lecturer gave immediate verbal feedback to the class on each answer, acknowledging correct answers and elaborating with further explanations to reinforce knowledge. All students were also asked to elaborate further on correct answers in some instance. Wrong answers were acknowledged with a positive tone and students were asked to re-attempt answering. In the instance where no one in class was able to provide an answer, the lecturer offered hints or subtle reminders to encourage knowledge recall, failing which - the lecturer provided the answer, if no accurate answers were given after several attempts. Upon engaging in the self-review and lecturer-review process, students completed the post-test (theory and practical test). As students in control-group were not involved in play-testing *Virtual Designer*, they were not required to answer *Survey Sheet 2*.

The treatment group did not engage in self-review and lecturer-review process as the control group students did. The process of lesson review and recall of prior knowledge were conducted through a 60-minutes play session of *Virtual Designer*. In this instance, the lecturer acts as facilitator in class, providing students instructions or assistance when necessary. The lecturer first presented a short demonstration on *Virtual Designer*, briefly explaining game and navigation controls. Instructions of in-game tasks (that students were required to complete) were also provided. Students were also informed about the availability of a "library" section in the game, which contains key concepts and definitions of design vocabularies used throughout the game. The "library" section is accessible in the game if students require a quick review on design theories. Students began by spending the initial 10 minutes customizing their avatars characters and familiarise with the game controls. Students that encountered problems, such as computer hardware problem, wrong controls, confused with instructions, were promptly provided with assistance. Upon familiarising with the game's interface and controls, students proceeded to spend 50 minutes to complete all in-game tasks. There were 3 main scenarios and 2 side missions. Students were required to complete all scenarios and missions within 50 minutes. Students may also re-attempt completed scenarios or missions at their own discretion. Following 1-hour session of play, students are required to complete Survey Sheet 2 (post-game opinion-based survey) and post-test.

6.2.2 Analysis of Pre-Test/Post-Tests

Pre-Test/Post-tests was conducted for 2 digital media courses on two campuses – Design for Digital Media 1 (Vietnam), Design for Digital Media 2 (Vietnam) and Design for Digital Media 2 (Australia). Each course consisted of 2 classes, which was assigned into control and treatment groups. Both groups completed a pre-test and post-test, which consisted of a theory and practical component with a scoring range from 0-100%. Students in control group completed the post-test after conventional teaching methods, while students in the treatment group the same test after a session of playing *Virtual Designer.*

In analysing the data, boxplots were created to examine differences between control and treatment groups in each course. A Sharpiro-Wilk test was conducted to determine if distribution of test score differences between control and treatment groups are normally distributed. This was followed with a paired-samples *t* test procedure in SPSS. Results of the *t*-test was interpreted and different values were reported, such as mean, standard deviation, mean differences, appropriate *t*-value, degrees of freedom and *p* value. Effect sizes were also calculated and reported.

6.2.2.1 Detecting Outliers and Testing for Normality

Boxplots was generated (see Appendix 6) to identify possible outliers in the pre/post-test scores of control and treatment groups for each course. Through boxplot inspection for values higher than 1.5 box-lengths from the edge of the box, no outliers were detected in all Vietnam class groups. 1 outlier was detected in the post-test score of the Melbourne group. Further inspection of the data confirmed that there was no abnormality about the outlier. As such, it was included in the *t*-test calculation.

Shapiro-Wilk test (see Appendix 6) was conducted to determine if pre/post-test scores between control and treatment groups were normally distributed. The Shapiro-Wilk test indicated that pre-test and post-test scores for control and treatment groups of all 3 courses were normally distributed.

6.2.2.2 Paired Samples *t*-test

In analysing the data, scores of pre-tests and post-tests were totalled and paired-samples t-test was used to determine if there are significant differences between scores of resulting from the two treatments.

DDM1 (Vietnam):

Control Group

In the DDM1 (Vietnam) control group, students performed better in post-test (*M* = 57.74, SD = 26.294) as opposed to pre-test (*M* = 54.52, SD = 23.215).

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Posttest	57.74	31	26.294	4.723
	Pretest	54.52	31	23.215	4.169

Table 20 - Paired Samples *t*-test (DDM1 Vietnam-Control)

The control group results indicated a mean increase of post-test scores at 3.226, 95% CI [-2.718, 9.170] between pre-test and post-test scores. Given that the *p*-value for pre/post-test differences is greater than 0.05 (*p=.277), d*=0.19; the mean difference between pre/post-test scores is not statistically significantly different.

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Posttest - Pretest	3.226	16.204	2.910	-2.718	9.170	1.108	30	.277

Table 21 - Paired Samples *t*-test (DDM1 Vietnam-Control)

Treatment Group

Similarly, the treatment group indicated a higher performance in post-test (*M* = 59.33, SD = 19.235) as opposed to pre-test (*M* = 50.00, SD = 20.889).

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Posttest	59.33	45	19.235	2.867
	Pretest	50.00	45	20.889	3.114

Table 22 - Paired Samples *t*-test (DDM1 Vietnam-Treatment)

A mean increase of post-test scores was observed at 9.333, 95% CI [5.416, 13.251]. Using *Virtual Designer* as a review tool resulted in a statistically significant increase in students' post-test scores compared to pre-test scores, $t(44) = 4.802$, $p = .000$, $d = 0.71$.

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Posttest - Pretest	9.333	13.038	1.944	5.416	13.251	4.802	44	.000

Table 23 - Paired Samples *t*-test (DDM1 Vietnam-Treatment)

DDM2 (Vietnam):

Control Group

In the DDM2 (Vietnam) control group, there were no mean differences between students' post-test ($M = 60.33$, SD = 25.255) and pre-test scores ($M = 60.33$, SD = 26.455).

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Posttest	60.33	30	25.255	4.611
	Pretest	60.33	30	26.455	4.830

Table 24 - Pre-test and Post-test Mean Scores (DDM2 Vietnam-Control)

No mean increase was observed in the post-test scores of the control group at 0, 95% CI [-7.206, 7.206].

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Posttest - Pretest	.000	19.298	3.523	-7.206	7.206	.000	29	1.000

Table 25 - Paired Samples *t*-test (DDM2 Vietnam-Control)

Treatment Group

In the DDM2 (Vietnam) treatment group, students performed better in post-test (*M* = 72.05, SD = 17.944) as opposed to pre-test (*M* = 63.59, SD = 22.300).

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Posttest	72.05	39	17.944	2.873
	Pretest	63.59	39	22.300	3.571

Table 26 - Pre-test and Post-test Mean Scores (DDM2 Vietnam-Treatment)

A mean increase of post-test scores was observed at 8.462, 95% CI [3.227, 13.696] in the treatment group. There was a statistically significant increase in students' post-test scores compared to pre-test scores, $t(38) = 3.273$, $p = .002$, $d = 0.52$.

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Posttest - Pretest	8.462	16.147	2.586	3.227	13.696	3.273	38	.002

Table 27 - Paired Samples *t*-test (DDM2 Vietnam-Treatment)

DDM2 (Melbourne):

Control Group

In the DDM2 (Melbourne) control group, students performed better in post-test (*M* = 66.88, SD = 16.215), compared with pre-test scores (*M* = 61.25, SD = 22.174).

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Posttest	66.88	16	16.215	4.054
	Pretest	61.25	16	22.174	5.543

Table 28 - Pre-test and Post-test Mean Scores (DDM2 Melbourne-Control)

A mean increase of post-test scores was observed at 5.625, 95% CI [-4.665, 15.915]. The increase in post-test scores after conventional teaching review was not statistically significant - *t*(38) = 3.273, *p* > .005, *d* = 0.29.

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Posttest - Pretest	5.625	19.311	4.828	-4.665	15.915	1.165	15	.262

Table 29- Paired Samples *t*-test (DDM2 Melbourne-Control)

Treatment Group

In the DDM2 (Melbourne) treatment group, there were no mean differences between students' post-test (*M* = 77.06, SD = 16.869) and pre-test scores (*M* = 77.06, SD = 16.494).

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Posttest	77.06	17	16.869	4.091
	Pretest	77.06	17	16.494	4.000

Table 30 - Pre-test and Post-test Mean Scores (DDM2 Melbourne-Treatment)

No mean increase was observed in the post-test scores of the treatment group at 0, 95% CI [-7.495, 7.495]. The use of *Virtual Designer* did not result in performance improvement in students' post-test scores.

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Posttest - Pretest	.000	14.577	3.536	-7.495	7.495	.000	16	1.000

Table 31 - Paired Samples *t*-test (DDM2 Melbourne-Treatment)

6.2.2.3 Summary of Paired-Samples *t*-test Results

Paired-samples *t*-test was used to determine if there were any significant mean differences between the pre-test and post-test scores of students who used *Virtual Designer* as an interactive learning tool, compared with students that reviewed lessons through conventional teaching methods. Data are mean (standard deviation), unless otherwise stated. Box-plot inspections indicated that no outliers (more than 1.5 box-lengths from edge of the box) were detected in the control and treatment groups' data in DDM1 and DDM2 Vietnam. In DDM2 Melbourne, 1 outlier was detected in the post-test score. Upon further examination, the student in question scored 100 in their post-test score, which was an above average score in the DDM2 treatment group data. It was thus decided that the data was included into the *t*-test calculation to present an accurate view of the overall data set.

Results from Shapiro-Wilk's test (p > .05) assessed that assumption of normality was not violated in the data.

The treatment group students in both DDM1 (M = 59.33, SD = 19.235) and DDM2 (M = 72.05, SD = 17.944) students in Vietnam performed better in post-tests after using *Virtual Designer* as learning tool, as opposed to control group students who reviewed lessons through conventional teaching methods (DDM1 - M = 54.52, SD = 23.215), (DDM2 - M = 60.33, SD = 25.255).

In DDM1 (Vietnam), *t*-test results indicated that using *Virtual Designer* (treatment group) as a review tool resulted in a statistically significant increase of post-test scores at 9.333, (95% CI [5.416, 13.251), $t(44) = 4.802$, $p = .000$, $d = 0.71$. The control group of DDM1 (Vietnam) also indicated a mean increase of post-test scores (3.226, 95% CI [-2.718, 9.170]). However, the *p*-value for pre/post-test differences is greater than 0.05 ($p=.277$), d=0.19. As such, the mean difference between pre/post-test scores in the control group is not statistically significantly different.

A similar pattern was observed in pre/post-test scores of DDM2 (Vietnam). A significant increase was measured in DDM2 (Vietnam) treatment group. The mean increase of post-test scores was observed at 8.462, (95% CI [3.227, 13.696]). Using *Virtual Designer* as a review tool resulted in a statistically significant increase in students' post-test scores compared to pre-test scores, $t(38) = 3.273$, $p = .002$, $d = 0.52$. On the contrary, there were no mean differences between students' post-test (M = 60.33, SD = 25.255) and pre-test scores (M = 60.33, SD = 26.455) in the control group. No mean increase was observed in the post-test scores of the control group at 0, 95% CI [-7.206, 7.206].

The DDM1 (Melbourne) t-test results indicated that the control group students improved in their post-test scores (M = 66.88, SD = 16.215) compared with pre-test scores (M = 61.25, SD = 22.174) with a mean increase of post-test scores at 5.625, 95% CI [-4.665, 15.915]. This increase was not statistically significant – $t(38) = 3.273$, p >.005, $d = 0.29$. On the contrary –

there were no mean differences between pre-test (*M* = 77.06, SD = 16.494) and post-test scores (*M* = 77.06, SD = 16.494) of treatment group experienced no performance improvement in post-test scores. No mean increase was observed in the post-test scores of treatment group – 0, 95% CI [-7.495, 7.495].

In summary, based on *t*-test results, the following observations are made:

Digital media students in Vietnam (DDM1 and DDM2) experienced a statistically significant increase in test performance after the use of *Virtual Designer* as a learning tool, in comparison with students who studied through conventional teaching methods.

Digital media students in Australia (DDM2) did not experience any increase in test performance after the use of *Virtual Designer* as a learning tool. There was an improvement in test performance through conventional teaching methods, but the difference was not statistically significant.

The *t*-test results indicate that students from the Vietnam campus experienced significant performance gain in test scores from the use of *Virtual Designer*, while students from the Australia campus did not. Although measures were taken to ensure test conditions between both campuses were consistent (classroom setup, research procedures, lesson plans, etc.), the outcome of contrasting *t*-test results may be attributed to learner differences between student cohorts of both campuses. As previously discussed in Section 4.7, student cohort of the Vietnam campus primarily consisted of local students who were non-native English speakers. In Study 1's interviews, 3 lecturers from Vietnam have commented that students are often passive and do not actively participate with discussions in class. 2 lecturers attributed this passiveness to students transitioning from a Vietnamese high school environment – with classes conducted in their native Vietnamese language and typically using a rote-learning approach, to an English-speaking university setting that encourages an active discussions and participation in class. Unlike student cohort from the Australian campus, first year students in Vietnam will need to

adapt to studying academic subjects in a second-language, in addition to adapting to unfamiliar university environment that imposes a different teaching and learning style from their previous high school experience. As such, students from the Vietnam campus may face more challenges in the initial semesters of commencing their studies when compared with Australian students that transitioned from an English speaking high school learning environment.

Although students of both campuses meet the standard University English entry requirements, learning and speaking new design-specific vocabularies and terminologies may be a comparatively challenging undertaking for the non-native English speakers in Vietnam. Past studies have reported that non-native English speakers often face difficulties adapting acquired language skills into social and academic environment due to second language speaking anxiety, thus hindering progress in achieving their educational goals (Woodrow 2006). In Cheng et al.'s (2004) study on non-native English-speaking graduate students at a Canadian University, students reported frustrations in coping with both the language and academic expectations simultaneously during their studies, and felt that writing and speaking were most challenging tasks in classes.

The *t*-test result of this study where students from Vietnam experienced significant performance gains is perhaps indicative that the use of digital RPG could serve as a beneficial learning tool to aid second-language learners in reinforcing their understanding of new vocabularies in a safe environment. Given that players dictate the overall pace of the gameplay, it is possible that the game provides a platform for students to actively reinforce their understanding of new vocabularies and design theories at their own pace, eliminating passive learning tendencies and language anxiety that may hinder their learning. This point will be revisited in Chapter 8 as possible future research that builds on findings from this study.

6.3 Opinion-Based Surveys

6.3.1 Research Procedure

The opinion-based surveys were distributed to a sample of 101 digital media students. 6 collected surveys were not included as part of the data, due to incompletion in the surveys and invalid answers (selecting “strongly agree” for all questions). The opinion-based surveys were distributed in class during the Pre-Test/Post-tests (Section 6.2.2), where students completed Survey Sheet 1 before the pre-test and Survey Sheet 2 after the post-test.

Two opinion-based survey sheets (Survey Sheet 1 and Survey Sheet 2 – see Appendix 4) were administered before and after students played *Virtual Designer*. Students will indicate their responses through a Likert scale, which ranges between “Strongly Disagree” (1) to “Strongly Agree” (5).

Survey Sheet 1 contains 16 multiple-choice questions and is completed before students play *Virtual Designer*. Questions 1-14 of Survey Sheet 1 requires students to self-evaluate their level of confidence in different areas of design theories learned through face-to-face lectures. Students also will respond to questions on whether formal classroom teaching and learning environment adequately prepares them in different areas of digital media, such as proficiency in applying theoretical knowledge into practice, confident use of design vocabularies to articulate or critique creative outputs. Questions 15 and 16 are open-ended questions for students to provide their views on the most challenging aspects of learning design as a student, and the measures they take to improve their knowledge gaps when learning design.

Survey Sheet 2 is answered after students have experienced playing *Virtual Designer* and completed all assigned tasks within the game. Survey Sheet 2 contains 45 questions, divided into 5 sections: Main Scenario 1 (Printing), Main Scenario 2 (Colour Theory), Main Scenario 3 (Pitching to Clients), General Questions, Open-ended Questions. In questions 1-25, students evaluate each game scenario, rating the learning effectiveness and mechanics of each

scenario, and providing feedback on whether playing the scenarios adequately presented them with the opportunity to apply design theory knowledge into real world situations. Questions 26 – 43 are a set of general questions about whether students find *Virtual Designer* an effective learning tool in different aspects. For instance, was the game a useful platform to practice design theory knowledge; was the game engaging as an self-assessment learning tool; did the game increased understanding on standard workflow and processes practiced by design practitioners; and was the game an effective platform for students to role-play as design professionals.

Questions 44 and 45 of Survey Sheet 2 are open-ended questions for students to further express their views on the positive or negative aspects of the *Virtual Designer*.

Frequency tables were generated for collected responses to determine the counts and percentages of each Likert-scale category. Percentages for "Agree/Strongly Agree" and "Disagree/Strongly Disagree" were counted as combined totals to determine overall agreement/disagreement in each response. Some individual questions were combined together as a unified set to address a specific aspect. For open-ended questions, qualitative responses were was organised through coding schemes. The frequency of each code were counted and presented as percentages to identify common themes that emerged from student responses.

6.3.2 Pre-Game Survey Responses (Survey Sheet 1)

6.3.2.1 Learning Challenges

A majority of 51.6% students agreed that design theories are easy to understand through traditional lecture sessions, 22% disagreed, while 24% opted "neutral" as an answer. As such, it appears that students find that face-to-face lectures are adequate pedagogical means to learn design theories without difficulties.

Design theories easy to understand through lectures

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	6.3	6.3	6.3
	Disagree	16	16.8	16.8	23.2
	Neutral	24	25.3	25.3	48.4
	Agree	38	40.0	40.0	88.4
	Strongly Agree	11	11.6	11.6	100.0
	Total	95	100.0	100.0	

Table 32 - Design theories are easy to understand through lectures.

In addition, 56.8% of students agreed (as opposed to 24.7% in disagreement) that it is easy to see the relation of how design theories could be applied into practice. Hence, by attending classes, they sufficiently understand the relevance of how the design theories they learn could potentially be applied or fit into their practice.

Easy to relate theories with practice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	4	4.2	4.2	4.2
	Disagree	10	10.5	10.5	14.7
	Neutral	27	28.4	28.4	43.2
	Agree	37	38.9	38.9	82.1
	Strongly Agree	17	17.9	17.9	100.0
	Total	95	100.0	100.0	

Table 33 - Design theories are easy to relate with practice through classroom learning.

When asked if they were able to recall design theories learned in past semesters, 25.2% disagreed. 44.2% students are in agreement that their learning experience from prior classroom lessons provides adequate knowledge retention of design theory knowledge.

Able to recall theories from past semesters

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	6.3	6.3	6.3
	Disagree	18	18.9	18.9	25.3
	Neutral	29	30.5	30.5	55.8
	Agree	38	40.0	40.0	95.8
	Strongly Agree	4	4.2	4.2	100.0
	Total	95	100.0	100.0	

Table 34 - 44.2% students agreed that they were able to recall design theories taught in classes from previous semesters.

When asked about learning design vocabularies, 27.4% of students did not find it difficult to learn design vocabularies through lectures (40% remained neutral). 41% of students agreed that they actively use design vocabularies during discussions with their classmates and teachers in class.

Design vocabularies are difficult to learn through lectures

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	5	5.3	5.3	5.3
	Disagree	21	22.1	22.1	27.4
	Neutral	38	40.0	40.0	67.4
	Agree	22	23.2	23.2	90.5
	Strongly Agree	9	9.5	9.5	100.0
	Total	95	100.0	100.0	

Table 35 - Student survey responses on whether design vocabularies are difficult to learn through face-to-face lectures.

Actively use design vocabularies with classmates and teachers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	8	8.4	8.5	8.5
	Disagree	15	15.8	16.0	24.5
	Neutral	32	33.7	34.0	58.5
	Agree	33	34.7	35.1	93.6
	Strongly Agree	6	6.3	6.4	100.0
	Total	94	98.9	100.0	
Missing	System	1	1.1		
Total		95	100.0		

Table 36 - Does the students actively use design vocabularies to communicate with classmates and teachers within classroom settings.

While the majority of students find face-to-face lectures and classroom sessions as adequate settings to learn design theory knowledge and vocabularies, results indicate that students faced difficulties when it came to actual practice. 20% students agreed that they do not face difficulties applying design theories into their own practical design projects, while 45.3% disagreed.

Do not face difficulty applying theories to practice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	11	11.6	11.6	11.6
	Disagree	32	33.7	33.7	45.3
	Neutral	33	34.7	34.7	80.0
	Agree	16	16.8	16.8	96.8
	Strongly Agree	3	3.2	3.2	100.0
	Total	95	100.0	100.0	

Table 37 - Does students face difficulties applying design theories into their practical design works?

Similar pattern could be observed in responses when students were asked if they faced difficulties using design vocabularies to describe their projects effectively. 45.3% students agreed that they faced challenges, while 31.6% disagreed. 23.2% of the responses were neutral. Hence, based on results – while students feel that they are able to learn design

vocabularies through formal classes and lectures without difficulties, actual use of the same vocabularies to articulate and describe their design projects is a challenge.

Face difficulties using design vocab to describe works

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	10	10.5	10.5	10.5
	Disagree	20	21.1	21.1	31.6
	Neutral	22	23.2	23.2	54.7
	Agree	30	31.6	31.6	86.3
	Strongly Agree	13	13.7	13.7	100.0
	Total	95	100.0	100.0	

Table 38 – Does students face difficulties using design vocabularies to explain their design projects?

On the question of whether university learning adequately prepares them for real-world work situations, results indicated an overall positive response. A 63.1% majority agreed that studying design courses in university adequately prepares them to work in design studios as design professionals.

Design courses in university prepares for real-world studio

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3.2	3.2	3.2
	Disagree	8	8.4	8.4	11.6
	Neutral	24	25.3	25.3	36.8
	Agree	48	50.5	50.5	87.4
	Strongly Agree	12	12.6	12.6	100.0
	Total	95	100.0	100.0	

Table 39 - Design theories are easy to understand through lectures.

6.3.2.2 Level of Confidence

Questions 1 – 6 on Survey Sheet 1 was employed to measure students' level of confidence on different topics of design theories, as well as communication skills. Students were categorically asked if they agreed that they were confident in different areas of design theories, ranging from colour theory, typography, printing, brand identity and logo design. These design topics were embedded into the Main Scenarios of *Virtual Designer* as part of the learning outcomes identified for Design for Digital Media 1 and 2 design courses. All topics have been covered in previously through lecture and tutorial sessions in class. As determined by a Cronbach's alpha of .725, the scale displayed a high level of internal consistency.

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Confidence in colour theory	5	5.3%	22	23.2%	31	32.6%	31	32.6%	6	6.3%
Confidence in typography	1	1.1%	23	24.2%	39	41.1%	29	30.5%	3	3.2%
Confidence in printing	24	25.3%	32	33.7%	18	18.9%	19	20.0%	2	2.1%
Confidence in brand identity	0	0.0%	20	21.3%	31	33.0%	32	34.0%	11	11.7%
Confidence in logo design	3	3.2%	17	17.9%	31	32.6%	40	42.1%	4	4.2%
Confidence in communication skill	2	2.1%	19	20.0%	48	50.5%	22	23.2%	4	4.2%

Table 40 - Students' self-evaluated confidence level in different areas of design theories and skills.

The responses indicated that students in general felt confident in colour theory (38.9% agree), brand identity (45.7% agree) and logo design (46.2%) in particular. One theory that stood out was printing theory, which results indicated a contrasting skew towards disagreement compared with the other theories (59% disagree). This comparative lower figure could be attributed to the lack of practical exercises of printing theory practiced in class sessions. While students were required to extensively apply their colour theory, typography, brand identity, logo design knowledge and communication skills throughout the semesters – they were often required to execute and submit works entirely in digital formats, in which printing is not necessary. Whilst printing theory was explained through lecture sessions (ie, step-by-step explanations on the

preflighting process, images, the different kinds of printing type, etc), students lack the hands-on experience of preparing their works for printing.

Students also appear uncertain about their communication skills, with half the cohort (50.5%) selecting “neutral” as their confidence level. This is relevant with students’ lack of proficiency in using design vocabularies to describe their design projects (as indicated by results in the previous section), which likely inhibits students from communicating to peers/clients confidently.

6.3.3 Post-Game Survey Responses (Survey Sheet 2)

6.3.3.1 Apply Knowledge into Practice

In Survey Sheet 2 (post-game), students were asked if they were able to apply different theories into practical situations when playing Main Scenarios 1, 2 and 3 (Questions 1, 9, 16, 17, 18). Table 39 indicates that a 66.3-73.6% majority of students agreed that they were able to apply all five design theories into practical situations when playing the scenarios in *Virtual Designer*.

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Able to apply printing theory into practical situation	1	1.1%	6	6.3%	19	20.0%	55	57.9%	14	14.7%
Able to apply colour theory into practical situation	1	1.1%	4	4.2%	20	21.1%	56	58.9%	14	14.7%
Able to apply typography knowledge into practical situation	2	2.1%	6	6.3%	19	20.0%	53	55.8%	15	15.8%
Able to apply branding identity knowledge into practical situation	2	2.1%	3	3.2%	22	23.2%	51	53.7%	17	17.9%
Able to apply logo design knowledge into practical situation	1	1.1%	7	7.4%	24	25.3%	50	52.6%	13	13.7%

Table 41 - Responses on whether Main Scenarios 1, 2 and 3 in *Virtual Designer* enabled opportunities for students to apply theoretical knowledge into practical situations.

Questions 7 and 14 in Survey Sheet 2 asked students if practicing the in-game scenarios would enable them to perform specific real-world design tasks in their future projects more effectively.

Responses on both tasks were positive, with 65.2% of students in agreement that Main Scenario 1 enables them to preflight future design documents more effectively, and 65.3% students in agreement that practicing Main Scenario 2 enables them to identify different colour schemes in future projects more effectively.

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Practicing this scenario enables future preflights	0	0.0%	7	7.4%	26	27.4%	48	50.5%	14	14.7%
Practicing this scenario enables future colour scheme identification	1	1.1%	6	6.3%	26	27.4%	51	53.7%	11	11.6%

Table 42 — Does playing the scenarios enabled students to perform real-world design tasks more effectively?

Three questions (Questions 5, 12, 24) were asked on whether the Main Scenario tasks enabled students to acquire real-world experience and understand standard industry workflows of specific tasks. The results for all three questions indicated a positive response among students, with a percentage of 70.5% in agreement for pre-flighting print documents, 70.5% for experience the process of colour scheme selections in packaging design, and a 76.7% majority agreeing that they were able to experience the process of pitching a design project to clients by playing Main Scenario 3.

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Enabled real-world experience of preflighting docs	1	1.1%	8	8.4%	19	20.0%	56	58.9%	11	11.6%
Enabled real-world experience of colour selection	0	0.0%	5	5.3%	23	24.2%	54	56.8%	13	13.7%
Enabled real-world experience of pitching to clients	1	1.1%	6	6.3%	16	16.8%	54	56.8%	18	18.9%

Table 43 - Did the Main Scenarios enable students to experience standard industry workflows?

6.3.3.2 Improved Theoretical Knowledge and Soft Skills

The survey also sought to find out if students felt that their design theory knowledge has improved upon completion of the game. 5 questions (Question 38-42) were asked for each individual design theory topic that was embedded into Main Scenarios 1, 2 and 3. Responses for 4 topics tended towards positive – colour theory (60% agree), preflighting (55.8% agree), brand identity (63.2% agree), logo design (55.9% agree).

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Game improved colour theory knowledge	0	0.0%	9	9.5%	29	30.5%	46	48.4%	11	11.6%
Game improved typography knowledge	0	0.0%	10	10.5%	32	33.7%	46	48.4%	7	7.4%
Game improved preflighting knowledge	1	1.1%	8	8.4%	33	34.7%	44	46.3%	9	9.5%
Game improved brand identity knowledge	0	0.0%	7	7.4%	28	29.5%	49	51.6%	11	11.6%
Game improved logo design knowledge	0	0.0%	4	4.3%	37	39.8%	44	47.3%	8	8.6%

Table 44 - Did the game improved theoretical knowledge?

In addition, questions 33, 34, 36, 37, 43 were asked to obtain student feedback on whether the game improved additional skills and design knowledge, which includes: better understanding of standard workflow in the industry, improving creative-decision discussion, improving better application of design principles to their design projects and increasing client pitching skills. Responses for all categories skewed towards agree and strongly agree, with the highest percentage (67.3% agree) for the question "*this game increased my understanding of standard design processes in the industry*".

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Game increased understanding of standard design processes in industry	2	2.1%	6	6.3%	23	24.2%	48	50.5%	16	16.8%
Game enables better creative decision discussions	0	0.0%	14	14.7%	29	30.5%	44	46.3%	8	8.4%
Game enables better application of design principles to projects	1	1.1%	7	7.4%	30	31.6%	44	46.3%	13	13.7%
Game improved pitching skills	3	3.2%	10	10.8%	26	28.0%	40	43.0%	14	15.1%

Table 45 - Did the game improved additional design skills?

6.3.3.3 Engagement and Learning Feedback

As *Virtual Designer* uses game mechanics of digital RPGs, which included interaction with characters, questions were asked to determine student perceptions on their overall interaction experience with characters in Main Scenarios of the game. For each Main Scenario, students were asked if characters' reactions in the cut-scenes were good indicators of their ongoing performance within the scenario. As noted in Chapter 5, the scenarios of Main Scenarios 1, 2 and 3 follows a non-linear structure, where the non-playable characters' (NPC) reactions changes according to player's performance within the game. The outcomes at the end of each scenario varies as well, with characters giving either a positive, slightly negative or very negative response in accordance with students' overall performance in that scenario.

On responses of whether character reactions of Main Scenarios were good indicators of in-game performance (questions 6, 13, 21), student responses indicated 67.3% agreement for Main Scenario 1, 57.9% agreement for Main Scenario 2, 53.7% agreement for Main Scenario 3.

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Character's reaction in outcome good indicator of performance	0	0.0%	8	8.4%	23	24.2%	46	48.4%	18	18.9%
Character's reaction in outcome good indicator of performance	0	0.0%	10	10.5%	30	31.6%	41	43.2%	14	14.7%
Character's reaction in outcome good indicator of performance	3	3.2%	9	9.5%	32	33.7%	36	37.9%	15	15.8%

Table 46 - Did characters' reactions in Main Scenarios provided good indication of in-game performance?

From an engagement and instructional point of view, 58.9% students agreed that the character provided clear instructions on task objectives of the Main Scenarios (Question 3). As Main Scenario 3's characters in the pitching mission involved the lengthiest conversations with the player in comparison with Main Scenarios 1 and 2, students were asked if the conversational responses of characters in Main Scenario 3 kept them interested in answering the questions of the mission (Question 20). 56.9% students agreed, 12.7% disagreed and 30.5% students remained neutral in their response.

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Character gave clear instructions on objectives	1	1.1%	9	9.5%	29	30.5%	44	46.3%	12	12.6%
Conversational responses kept me interested in answering questions	1	1.1%	11	11.6%	29	30.5%	39	41.1%	15	15.8%
Responses of characters kept me engaged as I answered questions	1	1.1%	11	11.6%	24	25.3%	49	51.6%	10	10.5%

Table 47 - Was there clarity in objectives and were students engaged in answering the questions through conversational responses with characters?

Were students engaged to be interested in completing the tasks and questions set out for all 3 scenarios? 64.2% students agreed for Main Scenarios 1, 66.3% agreed for Main Scenario 2, while Main Scenario 3 indicated 61% of students in agreement that they were motivated to answer posed questions correctly to watch the outcome of the scenario.

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Interested to complete task successfully to watch outcome	1	1.1%	7	7.4%	26	27.4%	50	52.6%	11	11.6%
Interested to complete task successfully to watch outcome	0	0.0%	9	9.5%	23	24.2%	48	50.5%	15	15.8%
Motivated to answer correctly to watch outcome	0	0.0%	8	8.4%	29	30.5%	42	44.2%	16	16.8%

Figure 30 – Were students engaged to complete the tasks successfully to watch the outcomes of the Main Scenario scenarios?

6.3.3.4 Digital RPG for Digital Media Courses

A majority of 76.8% students agreed that they find *Virtual Designer* to be a useful learning tool. 56.8% students agreed that playing the game required them to recall design theories that were taught in previous classes. 66.3% students agreed that they would be interested in playing digital RPGs similar as *Virtual Designer* to assess their knowledge in other areas of design. Lastly, 73.7% students are in agreement that *Virtual Designer* is an engaging way to practice their design theory knowledge.

64.2% students agreed that *Virtual Designer* worked as a good platform for them to role play as a design professional. Notably, 78.9% students agreed that playing *Virtual Designer* enabled them to identify their weak areas in design theories.

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Game is good platform to roleplay as professional	0	0.0%	4	4.2%	30	31.6%	44	46.3%	17	17.9%
Find game to be engaging way to practice design theory knowledge	0	0.0%	0	0.0%	25	26.3%	47	49.5%	23	24.2%
Interested in playing RPG to test knowledge in other areas	1	1.1%	5	5.3%	26	27.4%	40	42.1%	23	24.2%
Find game to be a useful learning tool	1	1.1%	2	2.1%	19	20.0%	54	56.8%	19	20.0%
Rather take formal tests than play games to test knowledge	16	16.8%	23	24.2%	23	24.2%	28	29.5%	5	5.3%
Able to identify weak areas in design theories through game	2	2.1%	6	6.3%	12	12.6%	56	58.9%	19	20.0%
Required me to recall previous design theory lessons	1	1.1%	8	8.4%	32	33.7%	36	37.9%	18	18.9%

Table 48 - Did students find the game useful for learning?

6.3.4 Open Ended Questions

At the end of each survey sheet, two open-ended questions were asked. In the process of analysing the data, categories were created with defined criteria. The total occurrences of responses that fall into each category were tallied to construct frequency distribution tables.

The first open-ended question in survey sheet 1 was: "***As a design student, what aspects in design do you find the most challenging to learn?"*** Based on responses provided, the following categories were generated with defined criteria:

Categories	Criteria
Creativity	Achieving originality and innovation in design works. Grasping the creative process within the project workflow.
Ideas	Refers to process and best practices of idea generation and concept development for design projects.
Theories	Understanding design theories, studying subjects that are more theory-focused.
Vocabularies	Learning and understanding new vocabularies of design theories, proficiency of speaking the design language to describe/critique works.
Software Skills	Learning new software, increasing proficiency of using industry standard software to complete design projects.
Applying Theories	Applying design theory knowledge into practice. Adapting and combining different theories for practical application.
Design Skills	Acquiring professional design skills and soft skills to be effective practitioners (ie hand drawing, communicating skills, animation).
Industry	Understanding industry workflow, job-readiness.

Table 49 - Categories for open-ended survey question – what aspects in design did students find it most challenging to learn.

Themes	*n*	%	Sample Comments
Creativity	7	10	*"Creativity. It's hard to be original."*
Ideas	8	11	"*Developing and illustrating ideas."* *"Creating new concepts for projects."*
Theories	19	27	"*Media Cultures 1 theories."* *"Colour theory is very difficult to learn and remember."*
Vocabularies	4	6	*"New vocabularies and ways of creativity."* *"Vocabularies and theories."*
Software Skills	6	9	*"Too many software to learn and use."* *"Remember software tools and how to use it."*
Applying Theories	5	7	*"Apply theories into practical works."*
Design Skills	18	26	*"Brand self as designer, pitching to clients."* *"Hand-drawing techniques."*
Industry	3	4	*"How to have a job."* *"Actual design process – start to finish."*

Table 50 - Qualitative comments from students.

Based on frequency count, students find that the most challenging aspect of learning digital media courses was design theories, with 27% accounted to responses that refers to specific design theory topics and subjects. The second most commonly cited learning challenge was design skills (26%), which includes practical and technical design skills such as drawing, branding, sound design, illustrations etc. The 3rd and 4th common responses are on idea generation (11%) and creativity (10%) when designing their projects.

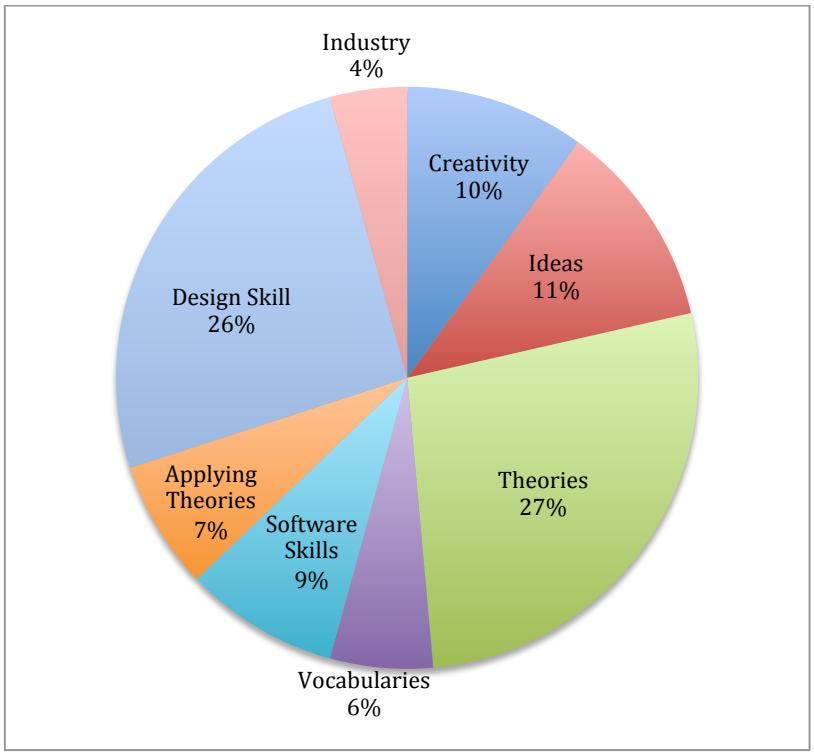

Figure 31 - Learning challenges in design based on student responses.

The second open-ended question in Survey Sheet 1 asks students what are the measures they take to improve their knowledge of design theories. The most common response (27%) cited was the use of visual references. Students sought inspiration and improve design theory knowledge by viewing photographs, artworks and designs created by other designers. Books (23%) were also cited as a method of improving design theory knowledge. The third common response was by practicing the use of their design theory knowledge, mostly through direct application of theories into their own design projects. Other means of improving design theory knowledge were self-learning (11%), taking in freelance jobs and gaining experience/proficiency in using design theory knowledge (10%), learning with peers (6%) and learning through video tutorials (4%).

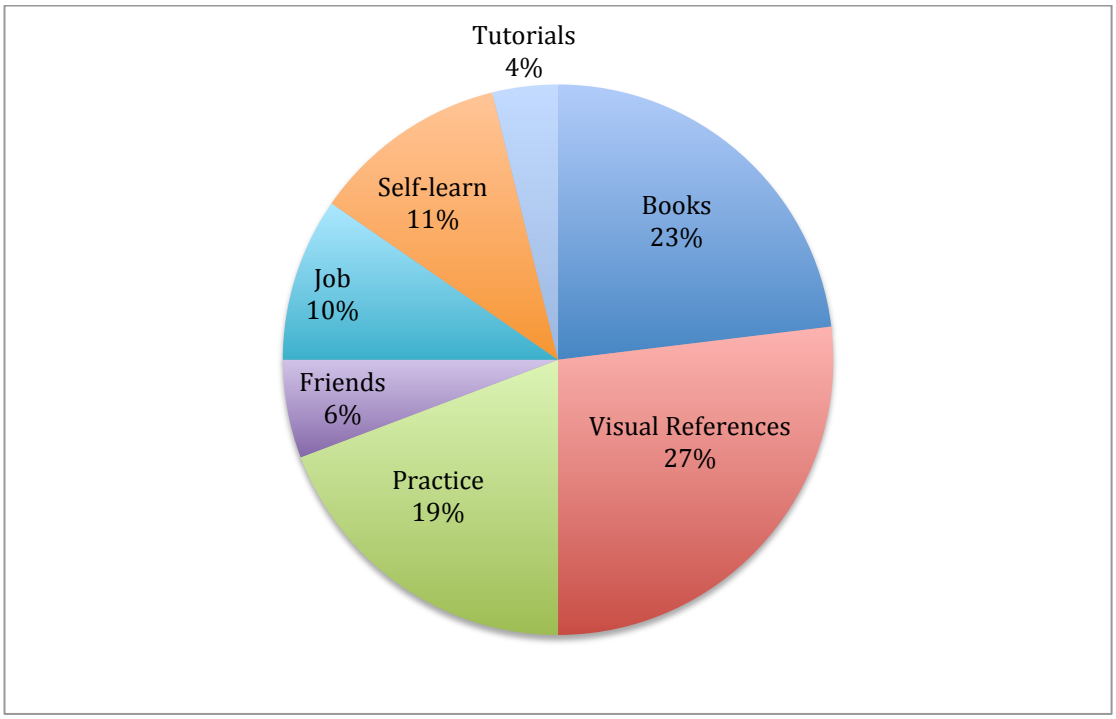

Figure 32 - Measures students take to improve knowledge in design theories.

Survey Sheet 2's open-ended questions asked students to provide feedback on positive and negative aspects of *Virtual Designer* as a learning tool to accomplish learning outcomes of digital media courses. The following category system was created to quantify qualitative data and calculate its frequency distribution for positive aspects of the game:

Categories	Criteria
Fidelity	Enjoyed the graphics, character design and overall visual design of the game.
Knowledge-gain	The game furthered understanding of design topics and skills, enabling knowledge-gain of previously learned subjects.
Real-world	The game provided real-world experience of handling design projects or working within studio settings. Scenarios give a glimpse of what to expect as a design practitioner and better understanding of standard practices/workflow in the industry.
Entertaining	Finds the game fun, engaging, interesting to play.
Challenge	Appreciates the challenging nature of the tasks in the game.

Test	Appreciates that the game assesses design theory knowledge/skill to identify weaknesses and strengths for further improvement.
Gameplay	Enjoyed the overall gameplay, mechanics, finds the interface controls easy to use.

Table – Categories for open-ended survey question - positive aspects of the game.

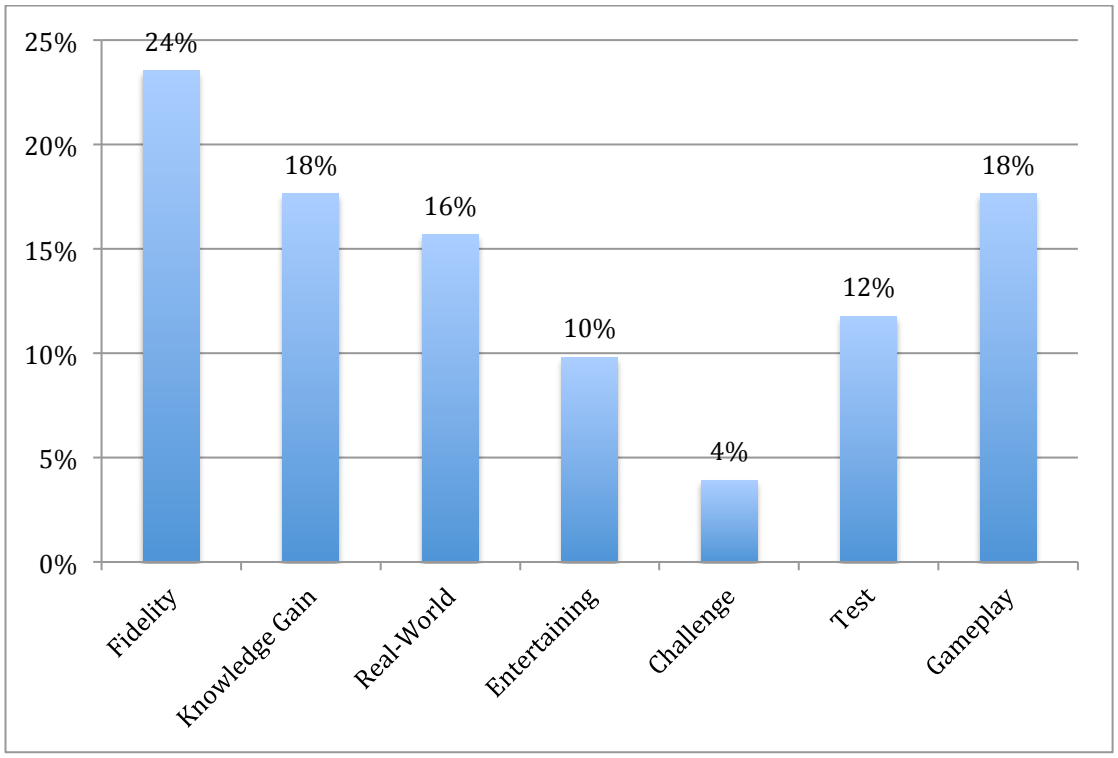

Figure 33 - Positive aspects of the game

Fidelity (24%) was one of the most commonly mentioned positive aspects of the game. As previously discussed in Chapter 5, *Virtual Designer* was designed as a 3d RPG. One of the design considerations of the game was ensuring high fidelity graphics in the interactive scene environment and character design to achieve better realism, enabling a more convincing studio working experience for players as they navigate through the game scene and interact with characters. Fidelity being the most commonly cited positive aspect of the game is an indication

that the high-fidelity graphics in *Virtual Designer* was effective in increasing visual appeal and engagement during students' game-playing experience.

The second most commonly described positive aspect was knowledge-gain (18%) and gameplay (18%). Responses categorised in the "knowledge-gain" category refers to positive comments that implied enhanced understanding in design theory topics or skills through playing the game – an indication of some level of learning effectiveness achieved through the game-playing experience. Gameplay (18%) was also the second most commonly cited response, reflecting that students enjoyed the game mechanics, interactivity and overall gameplay experience whilst using *Virtual Designer* as a learning tool. The third positive aspect commonly mentioned by students was Real-World experience (16%). Responses that fall into this category referred to positive aspects within the game that enabled practical real-world experience of applying design theory knowledge into projects or hypothetical situations, as well as experiencing or understanding standard workflow and processes used by design practitioners in the industry. The following category system was created to quantify qualitative data and calculate its frequency distribution for negative aspects of the game:

Categories	Criteria
Gameplay	Problems encountered with the gameplay, mechanics, the interface controls were difficult to use.
Objective and Feedback	Uncertain about the intended objectives of the tasks. Lack of clarity in instructions, lack of feedback on results and overall performance.
Knowledge	Did not have sufficient knowledge to perform well in the game. Did not understand questions or terminologies used by characters.
Technical glitches	Technical aspects of the game - complaints about character animation, voiceover glitches, font-sizes too small/too large, etc.
Difficulty	Game was too challenging and too difficult. Frustrated for not being able to answer questions correctly.

Table 51 - Categories for open-ended survey question - negative aspects of the game.

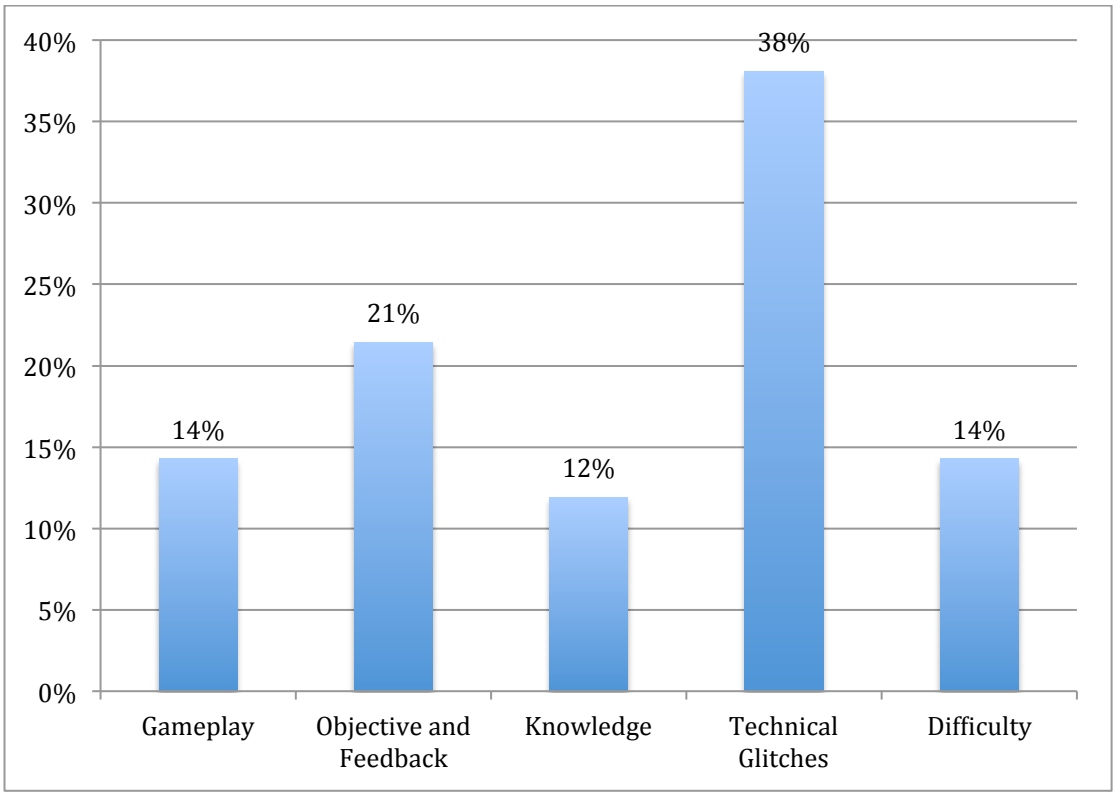

Figure 34 – Negative aspects of the game

The four negative aspects that were most frequently commented by students were technical glitches (38%), objective and feedback (21%), gameplay (14%) and difficulty (14%). A number of responses referred to different technical glitches experienced within the game (38%), for instance, comments such as "*bad V/O syncing with error*" – referring to the brief 2 seconds audio syncing glitch of Main Scenario 3, or comments such as "*lagging, pre-rendered graphics"*, referring to the occasional loading time of cut-scene graphics. This was attributed to limitation of the computer hardware in the class lab and beyond the control or scope of this study.

21% of the responses referred to "objective and feedback". Comments of this category referred to the lack of clarity in the task objectives of Main Scenarios and not fully understanding what was required to complete the task. Some responses include - *"First scenario's objective was unclear"*, *"description not clear to understand", "subtitle confusing – task objectives not clear.*" As all Main Scenarios are scenario-based, characters at the start of each scenario briefly

mention the task objectives and instructions for each Main Scenario in a conversational manner and the in-game tasks immediately begins. Based on observations during gameplay, some students instinctively skipped the dialogue of cut-scenes repeatedly to start the tasks immediately. Skipping through the cut-scenes would have resulted in the students missing the essential instructions and task objectives explained by the characters, thus not understanding what to do when confronted with the in-game tasks later.

Another factor worth considering is the conversational manner of the characters as they explained the tasks. Clearly, explaining task objectives and instructions through character dialogues in cut-scenes was an inadequate method and would have prevented students from accomplishing the tasks successfully. A possible measure in ensuring further clarity is by the use of an additional screen to explicitly list out the objectives and instructions before students begin the tasks. Some comments also noted the lack of feedback of their overall performance. One comment stated, "*should tip players. didn't know questions in colour theory. should give tutorial while playing. character expressions should be more explicit.*" Another noted: *"Solutions and answers needed"*. While the game was designed to increase understanding of design theory knowledge through in-game scenarios, students are expected to have already acquired design theory knowledge through classroom sessions. As such, the game was not designed as a didactic tool to provide tutorials or lessons of these design theories. As explained in Chapter 5, a Library section is accessible within the game to provide quick reviews on design topics such as colour theory and typography if necessary. In addition, the game did not include answers/solutions to students. Upon completion of each Main Scenario, students will be presented with the outcome of the scenario (for example character is happy/unhappy), followed by a performance screen (3 stars for best performance, 1 star for performance). For a detailed score sheet, students could access the trophy section, which lists out the number of attempts and numbers of questions answered correctly or wrongly in each mission. Answers and solutions not revealed in the end of each mission was a deliberate decision made during the game development process. This encourages students to rethink their previous attempts of the same tasks and reattempt the same missions with different solutions. Mistakes and failures are

often an effective tool to create opportunities for learning – as such, not revealing the answers in the end encourages students to inquire and rethink solutions or problem solve in a more independent and open-ended manner.

14% of the students complained that they struggled with the gameplay, such as unfamiliar keyboard controls and encountering problems navigating through the game environments. It is imperative to note that controls of the game were briefed to students before the start of the play testing session. In addition - upon creating the avatar at the start of the game, a dialogue box appears with explanations on how to control the playable character (arrow keys to move the character, spacebar to talk or skip dialogues). A number of students appeared to struggle with character control at the start, but were promptly assisted by the lecturer. On another note - controls for the Main Scenario tasks however could have been more explicit. Aside from task questions, there were no instructions on how to make selections of answers. This lack of clarity was an oversight during the game development process as it was wrongly assumed that all players would instinctively know how to make a selection using the same keys for character control (arrow keys to choose a selection and spacebar to confirm).

14% of the students commented that the game was too difficult or challenging. 3 comments suggested that there should be an option to change difficulty levels of each mission. As noted earlier, the game assumes all players had adequate level of prior knowledge in design theory from formal lectures. The tasks and questions in *Virtual Designer* were based entirely on the lecture and course materials used in Design for Digital Media 1 and 2 to ensure proper alignment with learning objectives and learning outcomes. As such, the difficulty level of the game is deemed appropriate for the level of Design for Digital Media 1 and 2 students and varying degrees of difficulty level is not necessary. Contrastingly, 4% of responses commented that the difficulty and challenging nature of the tasks were positive aspects of the game, reflecting that some students appreciated the challenge presented to them within the game.

The comments that the game was too difficult could be attributed to poor prior knowledge among the cohort of students – this is reflected by the results of pretest and post-test (Section 6.2.2.2) where some students performed very poorly on the pretest itself, suggesting a poor comprehension of design theory knowledge. As the game was not designed as a didactic teaching tool and assumes prior knowledge on the students' part - a possible measure to curb this issue is to filter out students that fared poor pretest scores and require them to do lesson reviews in class prior to attempting the game.

6.4 Focus Group

6.4.1 Research Procedure

12 students participated in focus group sessions, conducted before and after students have played *Virtual Designer* in class. Participation was voluntary and sessions were conducted outside class hours in a computer laboratory on campus. The pre-game focus group session began with the interviewer explaining the premise of the research. Using an interview guide - questions were asked, in which students in the focus group took turns to respond accordingly. The questioning process was conducted in a semi-structured manner, enabling students to further elaborate or expand on discussion points when necessary. Students were not required to respond to all questions and may choose to provide input or contribute to the discussion as they see fit. In some instances, students expanded on other student's given insights and opinions.

The questions in the focus-group sessions seek to provide students the opportunity to expand and elaborate their responses from the opinion-based surveys. Student responses were transcribed verbatim. Responses were tallied and organised according to general theme for each question to present an overview of opinions conveyed by students.

6.4.2 Pre-Game Focus Group Interview

The pre-game focus group discussions revolved around topics on learning challenges and difficulties students faced when studying design courses. Students also shared how their level of confidence in theoretical and practical aspects of design, and learning methods or external resources they have used in the past to improve their design knowledge and skillset. Table 52 provides a general summary on students' responses in the pre-game focus group interview:

Questions	Responses	Sample Comments
Students' confidence level in design theories knowledge (Q1)	Not very confident (n=4)	*Sometimes I am not too confident about how to use the theories… and sometimes I can't remember all the principles and rules learned in class.*
Biggest learning challenge when studying digital media courses (Q2)	Design vocabularies (n=2)	*Remember the terms and stuff… There are something that are typically hard to understand.*
	Applying knowledge (n=3)	*I know the design theories but uhh, there's situations, I cannot apply it. Knowing is one thing I think, but to apply it is a different matter.*
Measures taken to overcome learning challenges (Q3)	Self revision (n=2)	*Umm, read again, in the book, and…to like, remind myself, like once in a while, I have to look it up again.*

	Does not revise often (n=3)	*I don't revise often, when I do it, I'm doing something else. IF I don't know something then I'll look it up.*
Is it easy to understand design theories through lectures and class materials (Q4)	No (n=6)	*No. I think the slides just show us some theories. We have to find our own books when we do our assignments. We need to find information.*
Is it easy to apply design theories and principles into works (Q5)	Depends (n=3)	*Depends on lecturers… the examples that they show in class and how does it apply to practical artworks.*
Is it easy to speak and write using the design language (Q6)	Quite easy (n=2)	*It's hard at first but after you know the words well enough it gets easier.*
	Not easy (n=6)	*It is very hard to use all the design words to explain our works when our teachers want the concept documents.*
Is it easy to recall design theories learned in previous semesters (Q7)	Some (n=3)	*Not too bad, but sometimes if I can't remember, I'll look it up.*
	No (n=5)	*Hard! If you're asking me grid systems now I probably can't answer anymore. Can't remember all… there's so many theories!*

Measures taken to improve knowledge outside of class (Q8)	Books (n=2)	*I go to the library, borrow books and look at other artists' works for examples and inspiration.*
	Tutorials (n=3)	*Learn from online tutorials to upgrade my software skills… like Digital Tutors.*
	Projects (n=2)	*I do personal projects when I'm free…. Sometimes I draw a lot, just to improve my skills.*
Does classes prepare students with adequate design theory knowledge for working in the industry (Q9)	No (n=4)	*Not really…. Because it's country specific - it depends on the country. Like, working on the assignments I feel like working for foreign studio. But if I'm working for Vietnam studio, like example like in-house, it's totally different.*
Does learning in classrooms provide students with a realistic experience of what to expect as a design professional in the industry (Q10)	No (n=3)	*I think actually doing it will be more realistic… like internships. Doing only assignments feel more like school work, I don't feel like I'm working in the industry.*

Table 52 – Pre-Game Focus Group Interview Comments

6.4.3 Post-Game Focus-Group Interview

In the post-game focus group, students discussed their overall thoughts about their game-playing experience of *Virtual Designer*. Questions ranged from aspects about game usability, interface design, scenarios. Students elaborated on difficulties faced when interacting with the game, features they found useful or interesting in furthering their theoretical and practical knowledge in design, and their opinions on whether or not digital RPGs like *Virtual Designer* could be used as an effective learning and knowledge assessment tool for design education. Table 53 provides a general summary on students' responses in the post-game focus group interview:

Questions	Responses	Sample Comments
Was playing the game an enjoyable learning experience (Q1)	Yes (n=8)	*It's kind of like game-playing, it's different, we are more proactive in like actually learn the theory.*
Aspects of the game students liked most (Q2)	Interesting characters (n=2)	*Because some characters make me recall with some lectures, it's very fun. (laughs) Characters were interesting.*
	Assess weak areas (n=3)	*You know, the lecturers in the slides just give us the knowledge and information. We don't know how much we understand, we absorb this – but this game make me know which I know and what I don't know. It show what I doesn't know before.*

Aspects of the game students liked least (Q3)	Issues with subtitles in main scenarios (n=4)	*Too many words for me to read.* *You know when I skipped what they said, I skipped the answer.*
	Unclear feedback (n=3)	*Most of the parts – is there any like explanations after we give the answer? Like a – correct answer?* *We still don't know why we screwed up the print.*
Did students feel more motivated practicing design knowledge through playing the game, compared with traditional means (Q4)	Yes (n=6)	*Yea. It feels like actual situations. It's a realistic experience.*
Does the game helps overcome learning challenges (Q5)	Depends (n=2)	*Depends on lecturers… the examples that they show in class and how does it apply to practical artworks.*
Which main scenario was the most interesting to play (Q6)	Main Scenario 1 (n=3)	*Most interesting is the part 2 and part 1, because it's like, I can learn about the theories and learn how to print correctly.*
	Main Scenario 2 (n=3)	*The colour one. It says "say again", like it makes you don't believe the answer and*

		challenges your answer. It was very fun!
Was the game a useful learning tool to practice design theories (Q7)	Yes (n=7)	*It's really great - it shows my weaknesses in what I don't know so I was really very concentrated to do the work, very engaged.*
	Somewhat (n=2)	*Not really about teaching colour theory. It's to test you on how much you know, the result is not presented very well. But you can see it within the PDF file. It's supposed to be a game when the teacher reviews it to discuss what went right or wrong?*
Overall thoughts about the game (Q8)	Novel learning method for design courses (n=2)	*And I find it, like, um, effective in some ways, yeah, so it's welcoming, and there's actually a game about design. There's always a game about math and business, boring stuff, but I haven't seen a game in design so it's fun.*

Table 53 - Post-Game Focus Group Interview Comments

6.5 Discussion

6.5.1 Learning Challenges and Confidence Level

As presented in Section 6.3.2, survey results indicated that students find that learning new design theories through classroom settings were adequate modes of learning. Students agreed that through lectures and classes, they were able to understand design theories and see the relation and relevance on how these theories could be applied into practice. The open-ended questions did however reveal that 27% of students regarded design theories as one of the most challenging aspects when studying design. There is also a consensus that they are able to recall theories taught in classes from previous semesters without difficulty, indicating that knowledge retention resulting from classroom learning is perceived as effective from students' point of view. The same agreement applies to learning new design vocabularies in classrooms. Results indicated a general agreement that design vocabularies were easy to understand through classes and the design language was actively used in class when speaking with lecturers and peers.

Based on survey feedback, learning within classroom settings, such as lectures and tutorial sessions are adequate means for students to learn, understand and recall design theories and vocabularies. Conversely, when students were questioned about the application of design theories and vocabularies into design projects, responses skewed towards the negative side on the Likert scale. As presented in Section 6.3.2.1 – 45.3% students disagreed when asked if they were able to apply design theories into their own design projects. Students responded in a similar manner when asked if they were able to use design vocabularies effectively to explain their projects effectively, with 45.3% of the cohort agreeing that they faced difficulties. Hence, results indicate that students are able to learn design theories and vocabularies through formal classes and lectures without difficulties, however – they struggle with applying their acquired design theory and vocabulary knowledge into practical application in digital media projects. This finding is consistent with lecturers' perception in Study 1 (Section 4.7.3) that considers "applying

theories into practice" and "articulating works" as two of the main learning challenges students faced in class.

With regards to confidence level on different design theories and communication skills (Section 6.3.2.2), printing theory stood out as one of areas students felt the least confident in (59%). In teaching the subject area of printing, lecturers typically present a lecture slide and explain the overall preflight process to students in class. Visual examples are also provided to indicate the appearance and positioning of different printing marks (crop marks, bleed area, margin, registration points, etc.). Students are then provided a walkthrough on how to set up the printing marks through the software. The survey response of students generally lacking confidence in printing theory however is indicative that the current teaching and learning methods in class is not effective in enabling them to confidently perform the task.

Students also appear uncertain about their communication skills, with half the cohort (50.5%) selecting "neutral" as their confidence level. To reiterate lecturers' feedback in Study 1 - proficiency in speaking the design language has been flagged as a desirable learning outcome. In addition, lecturers have identified "articulating works" as one of the key learning challenges students faced in class. Students' uncertainty about their communication skills could be attributed to a lack of proficiency in using design vocabularies to describe their design projects.

6.5.2 Effectiveness as a Learning Tool

In evaluating the effectiveness of *Virtual Designer* as an educational tool, two types of data were considered – tested (pre/post-tests) and self-reported (opinion-based surveys, focus group interview). Pre-test and post-tests were used as means to quantitatively measure performance increases after the treatment group students played *Virtual Designer* in class. For DDM2, *t*-test analysis reported a statistically significant increase in treatment groups of DDM1 and DDM2. Conversely, the control groups either did not experience a significant increase in post-test score (DDM1 Vietnam), or did not experience any increase between pre-test and post-test scores

(DDM2 Vietnam). This result is indicative that the use of digital RPG as a review method in class is more effective in comparison with traditional modes of learning (review face-to-face with lecturer and self-review of lesson materials).

The result is somewhat inversed with the cohort of DDM2 students based in Melbourne. Although *t*-test results indicated an increase in the control group's post-test scores, this increase was not statistically significant. More crucially, the students in the treatment group did not experience any performance increase in the post-test after using *Virtual Designer* as a tool. This differentiation in results could be partly attributed to the comparatively low sample size in the DDM2 Melbourne sample (16 in control group, 17 in treatment group), compared with the samples in Vietnam (DDM1: 31 in control group, 45 in treatment group; DDM2: 30 in control group, 39 in treatment group).

From a self-reported perspective, student feedback about the learning effectiveness of *Virtual Designer* was generally positive. When queried about whether the game improved theoretical knowledge in specific areas of design, the results tended towards the positive: colour theory (60% agree), preflighting (55.8% agree), brand identity (63.2% agree), logo design (55.9% agree). As *Virtual Designer* is not a didactic teaching tool and assumes prior knowledge on the students' part - these positive results of improved theoretical knowledge is attributed to students using the game as a platform to reinforce their existing knowledge in the theories of design, gaining familiarity in the subject and thus furthering their understanding.

One unexpected finding during the focus group interview was how students find the game to work as an effective tool to reveal areas that they were weak at (78.9%). Students also brought up this view during the focus group interview:

"You know, the lecturers in the slides just give us the knowledge and information. We don't know how much we understand, we absorb this – but this game make me know which I know and what I don't know. It shows what I doesn't know before."

"It's really great - it shows my weaknesses in what I don't know so I was really very concentrated to do the work, very engaged."

When *Virtual Designer* was designed, the objective was to provide students with a platform to practice applying their design theory knowledge within an environment that is "*safe to fail*". Through trial and errors, students will repeat scenarios (applying their design theory knowledge in the process), elicit different character responses and scenario outcomes, whilst reinforcing their knowledge on the subject. Both student responses above revealed how the game could also work as an effective tool to identify gaps of knowledge through their in-game performances. This will encourage students to review lesson materials before reattempting the game scenarios at a later point of time.

The game is also effective in increasing understanding of design processes. In Study 1, lecturers described how students lacked a realistic understanding on real-world design processes and workflow used in the industry, and adjustments were made towards their teaching methods and assessment designs to increase relevance of classroom learning activities with the real-world (Section 4.7.1). A notable result in the survey response was 67.3% of students felt that playing *Virtual Designer* has increased their understanding of standard processes in the design industry. Based on lecturers' input in Study 1, Main Missions 1, 2 and 3 were designed as scenarios that reflect real-world situations design practitioners would often face. Take for instance Main Mission 3, where students experience the process of finalising a logo idea based on a design brief, and subsequently pitching the selected design to clients. The game situates students in a simulated boardroom setting with 3d characters as virtual actors of the scene – all of which is rather difficult to replicate within a classroom environment.

Students also find that the game improved pitching skills (58%). This is an interesting response, considering students did not actually physically pitched throughout the entire game – but rather, their avatar "pitched" to clients through a selection of pre-made answers. This positive response

towards (virtual) pitching skills is indicative on how the role-played character served as an extension to one's self in performing tasks and building skills within the game world. This use of the game to improve pitching skills is relevant, as it may very well address the current gap in students' skills, where half the students (50.5%) were unsure about their communication skills (Section 6.5.2).

6.5.3 Achieving Learning Outcomes

This section will consider if *Virtual Designer* was effective in accomplishing desirable learning outcomes of digital media courses. To reiterate, the desirable learning outcomes identified by lecturers in Study 1 were:

- To acquire solid theoretical knowledge.
- To achieve proficiency in speaking the design language.
- To apply theoretical knowledge into practical contexts.

6.5.3.1 Solid Theoretical Knowledge

As previously described, *Virtual Designer* was not intended as a didactic teaching and learning tool. As such, the game assumes prior knowledge and does not contain all the learning materials (although there is an in-game library for students to quickly lookup key points or information). Lecturers in Study 1 have stressed that solid theoretical knowledge was essential as part of the design process.

To achieve this learning outcome, the Main Scenarios and Side Missions test students' knowledge in a variety of theories (colour theory, printing, typography, branding, etc.). In the Main Missions, students are presented with tasks and questions. For successful completion of the task, students need to recall design theories that they have learned in prior classes. In situations where students are unable to complete the tasks or performed poorly, students may

opt to do a quick review through the in-game library, or review course materials (outside of the game), before reattempting the main scenarios again. This continued cycle of completing tasks, reviewing and reattempting tasks again reinforces student knowledge in different areas of design theories.

The Side Missions were designed as primarily as a quiz, in which students are presented with random sets of questions of a range of different design theories as a means of having students to recall and reinforce their design knowledge. Although the questioning approach in Side Missions are comparative more simplistic and didactic than the Main Scenarios, it serves as a way for students quickly assess their overall knowledge in a wide range of design theories.

Although the treatment group students in Melbourne did not experience a performance gain in their post-test scores, the paired sample *t*-test result of both DDM1 and DDM2 treatment groups in Vietnam revealed a statistically significant increase in post-test scores. This result indicates the likelihood that students have received positive gains in theoretical knowledge upon playing *Virtual Designer* in class.

Students have generally regarded *Virtual Designer* as a useful tool in acquiring solid theoretical knowledge in design. As indicated in responses of open-ended question in Survey Sheet 2, knowledge gain (Section 6.3.4) was the second most cited (18%) positive aspect of *Virtual Designer*. And as described in Section 6.5.2, students were generally positive that *Virtual Designer* improved their theoretical knowledge in colour theory, preflighting, brand identity and logo design.

The students' qualitative view along with quantitative results from DDM1 and DDM2 (Vietnam)'s post-test scores, suggests that *Virtual Designer* works as an effective learning tool for students to gain solid theoretical knowledge.

6.5.3.2 Applying Knowledge

The ability to apply knowledge – to recognise relationships and patterns between theories and understand how the knowledge applies in practice or in real-world context, has been identified as a desirable learning outcome by lecturers in Study 1. In *Virtual Designer*, this was achieved through the design of Main Scenarios in particular. The main scenarios do not have a clearly defined topic, as completing the scenario tasks will often require the use of different areas of design theories. For instance, in completing the main scenario 3 (pitching to clients scenario) successfully, students need to combine their understanding of separate theories and conclude with an answer that would apply towards the client's situation. In one instance, students need to select a logo design with an appropriate typeface, when also taking into account on how that may impact the scalability of the design if the logo were to be printed in different sizes. In doing so, students are recalling typography, logo design and print theory, whilst simultaneously combining the understanding of 3 theories together to make an appropriate logo design selection that would fit the clients' needs in a practical setting.

66.3-73.6% of students agreed that playing Main Scenarios 1, 2 and 3 in *Virtual Designer* enabled them to apply different design theories into practical situations. In the open-ended questions, "real-world" was cited as one of the positive aspects of *Virtual Designer* – in which 16% of students conveyed how the game presented them with a further understanding on practices and workflow in the industry through handling of tasks within the game setting.

6.5.3.3 Proficiency in Speaking the Design Language

Characters in *Virtual Designer* speak in a conversational manner and when providing instructions to tasks, the dialogue includes terms and vocabularies associated with the theories of design, which students would have learned in class. This embedment of design language into the game texts was intended to simulate workplace situations, in which design practitioners often converse to one another with specialist language within their domain. As described earlier,

58% students find that playing main scenario 3 improved their pitching skill. While this may indicate an added of confidence in communication, it is difficult to ascertain if this response indicates an increased proficiency in speaking the design language. Contrary to the other 2 desirable learning outcomes discussed earlier (solid theoretical knowledge and applying knowledge), improved design language was not cited as one of the positive aspects of *Virtual Designer* in the open-ended question of Survey Sheet 2.

6.5.4 Game Fidelity and Engagement

As the intention of *Virtual Designer* was to situate students in a simulated workplace setting, extra time was spent on the overall design of the game environment. Not only does fidelity affects players' overall experience towards a game's visual appeal, it also influences player's level of enjoyment during their game-play experience, with fidelity of graphics influencing players' *"positive affect, intrinsic motivation, competence, autonomy, relatedness, and immersion*" in the game (Gerling, 2013). As such, a realistic 3d style was opted for *Virtual Designer* over a stylised 2d style to provide a believable and immersive role-playing experience for students as they play the game. This design decision has been proved effective, as evidenced by responses in opinion-based survey, which indicated that students find *Virtual Designer* were particularly drawn to the fidelity of the game in terms of overall visual design style, character design, cut-scenes, etc. Fidelity was the most cited (24%) positive aspects about *Virtual Designer.*

From an engagement point of view, the overall consensus (73.7%) was students find the game to be an engagement mode of learning digital media courses. In discussing why the game was considered as engaging, one student commented in the focus group interview:

"*It's kind of like game-playing, it's different, we are more proactive in like actually learn the theory."*

In Study 1, one of the teaching challenges raised by lecturers was to increase student engagement on the subject matter, especially towards materials or topics students find less exciting. Lecturers have also observed students as being passive learners. The comment above is an example of how *Virtual Designer* was perceived as an engaging mode of learning that simultaneously encourages active learning on the subject matter. 10% of the students regarded *Virtual Designer* as entertaining in the open-ended question of Survey Sheet 2. In the focus group interview, students attributed the engagement of the game towards interesting characters within the game: "*Because some characters make me recall with some lectures, it's very fun. (laughs) Characters were interesting."* Through conversational responses from characters, students' engagement level was sustained as they completed scenarios (62.1%).

As all main scenarios have a small narrative and simple branching mechanic - survey responses have also revealed that students were motivated to complete tasks successfully to view the outcomes of the main scenarios. It is also worth noting that through informal observations, students who scored poorly or average were seen attempting the scenarios in multiple successions, in effort of watching the best outcome in the final cutscene. In a few unexpected instances, students who received high scores were seen to reattempt and deliberately fail the scenarios to be able to watch the worst outcome possible in the scenario. Unexpectedly, the scenario outcomes resulting turned out to be a form of reward for students, intrinsically motivating them to complete the scenario tasks to their best effort – and reattempt the scenarios when necessary. As such, the non-linear mechanics of the main scenarios was effective in tackling lecturers' earlier observation of students being passive and unmotivated learners, inviting students to be more proactive in applying and reinforcing their acquired design theory knowledge within the game environment.

6.5.5 Issues

Unexpectedly, the main issues students had with *Virtual Designer* had less to do with the overall learning effectiveness of the game, but rather, to do with technical and gameplay issues. When students were asked about negative aspects about *Virtual Designer*, technical glitches was

most cited by students (38%). One of the most common technical glitch reported was an audio problem with the character of main scenario 2, in which the audio was distorted for 2-3 seconds and briefly disrupted the playing cutscene. This was unfortunately an oversight during the game development phase and the issue could not be rectified in time before the scheduled experiment. However, the brief audio disruption did not impact students' learning and execution of the scenario task, as subtitles were in place during the disruption and the audio returns to normal at the next scene.

As discussed in Section 6.3.4, students also find the gameplay to be a negative aspect of the game (14%), with some students reporting difficulties with navigating through the scene or progressing through the text boxes in the main scenarios. The game had fairly simple keyboard and mouse controls throughout with control instructions presented to students at the start of the game. Lecturers demonstrated how to navigate through the game in class. Students were also given 10 minutes to try out the game and get accustomed to the controls. Assistance was provided to students who were struggling with controls, before they attempted the scenarios. However, judging from students' feedback in survey responses, these measures were insufficient in introducing students to the controls. Intuitive controls is a critical aspect of the game – players should feel a sense of control over the game interface, as it contributes towards their sense of competence and increases motivation within the game (Sweetser and Wyeth, 2005; Ryan et al., 2006). A lack of familiarity with controls will also disrupt an immersive gameplay experience and impact students from achieving the intended learning outcomes of the game. The overall game controls could be reviewed and simplified to reduce usability issues in future uses.

With regards to learning, 14% of the students find that the scenarios were too difficult and as a result, they find the game frustrating to play. Rather conflictingly however, some students (4%) appreciated the difficult challenges presented to them within the game. During the focus group interview, a student described that the game was challenging but interesting: *"It's stressful but it is interesting. Especially when you get fired."* The "*get fired"* comment refers to main mission 1,

in which receiving a negative outcome will result with the character (a manager) being furious over player's poor performance and subsequently firing the player. The student in question confided that she received a negative outcome in this scenario, but was motivated to reattempt the scenario again despite her failure in attempt of receiving a better outcome. This is a reflection of Barreteau et al.'s (2001) view, which discussed how failures in RPG scenarios would provide students with essential learning opportunities, further stressing that the difficulty of the game should present students with high challenges to increase engagement.

Gee (2003) described the idea of how games should be "*pleasantly frustrating"*, in which the games should be challenging – yet accomplishable. This could be achieve by giving players control of customising the game to suit their ability levels and progressively make adjustments towards the game as their competency increases. As discussed in Section 5.3.4.7, one of the design considerations made for *Virtual Designer* was to give students control in their learning. Students are able to select scenarios based on their level of knowledge in the subject areas. If necessary, students could also review notes (in the game's library section) or course materials, before reattempting the main scenarios at a later point of time.

The designed game content was based upon lecturers' feedback on design topics that students have struggled the most (colour theory and printing theory in particular) and the in-game tasks were designed in reference to course materials lecturers typically use in face-to-face lectures. As students would have already learned the design theories before playing the game, *Virtual Designer* assumes that players have prior knowledge to be able to accomplish the tasks. Unlike typical tutorial modes that students were mode accustomed with, in which step-by-step guides or additional notes were provided to complete tasks, the game immediately situates the students in tasks and problems. No hints, guides or prompts are provided throughout the scenario, and students are required to recall their knowledge in design theories and respond accordingly. As reflected in the pre-test scores, a number of students played the game with very low pre-test scores, which indicated that they did not have the competency level necessary for successful completion of the game. This will affect their game-playing experience, as constant

(negative outcomes in scenarios) will negatively impact their motivation as they progress through the game. As such, prior to playing the game, perhaps the pre-test could be used as a competency test, and students who did not meet the minimum test-scores should be advised to review course materials before playing the game. To also further investigate this issue, in Study 3 (Chapter 7), lecturers will playtest *Virtual Designer* and be asked to provide their opinions on whether the difficulty level of the game was adequate or too high.

Another issue identified by students was the feedback and objectives being unclear (21%) in the game. However, when specifically asked if characters provided clear instructions on objectives, 58.9% of the students agreed. In *Virtual Designer*, the objectives of main scenarios were presented through character dialogues in the cut-scenes with audio voiceover and subtitles. As the dialogue was primarily conversational, students may easily miss out on the specific objectives of each task. The objectives of each scenario task were kept vague at the start, as the intention was to mimic real-world situations and add authenticity towards the learning experience, where problems are often unexpected and ill-defined, and design practitioners would need to respond accordingly. It was expected that this would encourage a more meaningful problem solving experience, as loosely defined problems presents players with added opportunities to attempt different strategies in problem solving (Papert 1993). This however appears to negatively impact students' learning experience. It is imperative that students fully understand the intended objectives before, as failing to do so will inhibit students from performing the tasks successfully. The lack of clarity in objectives could perhaps be addressed with a clearer presentation of objectives at the start of each scenario – for instance, adding a dedicated page before each scenario, which shows a list of objectives and instructions explaining how to complete the task.

Students commented that there was lack of clarity in the feedback, and at times they were not aware on reasons as to why their answers were wrong. Throughout the scenarios, students could gauge their in-game performance through characters' response and facial expressions, which dynamically changes based on students' responses. There was however no explicit "Right" or "Wrong" notifications as students respond to each question to avoid disrupting the

flow as the scenario unfolds – but instead, characters responds accordingly with dialogue (i.e "*Hmmm, I don't think that's the right colour scheme… but let's move on"*). Another plausible reason students find the feedback being unclear was because students skipped through the dialogues. The focus group discussion revealed that some students find that the scenarios dialogues were too long. They skipped through the cut scenes and jumped directly to the scenario tasks. This was unexpected during the development phase, as it was wrongly assumed that students will be interested enough to watch all the cut-scenes to follow the brief narrative in each scenario. As a result, students did not receive the necessary feedback and objectives (embedded within character dialogues in cut scenes that were skipped through). A preventative measure should be in place in the game to prevent students from skipping the essential cut scenes – or the option to replay the cut scene would allow students to access feedback and objectives as required.

Aside from the final outcome presented as cut-scenes at the end of each scenario, students will receive a result sheet, containing a score and an overview of how many answers were correct or incorrect. It does not however indicate which answers were incorrect – students have reported this as an issue. Some students have also commented that answers, solutions or tips should be provided in the game to help them accomplish the tasks. This has been considered during the initial game design phase of *Virtual Designer*, but given that the game assumes prior knowledge and is intended as a tool to review and reinforce design theory knowledge, the eventual decision was to exclude such mechanisms that decrease the difficulty of the challenges and enable longer playability of the game.

6.6 Limitations

Parametric tests were considered to for statistical analysis of pre-test and post-test data. There are 3 independent variables (DDM1 Vietnam, DDM2 Vietnam and DDM2 Melbourne) in this study, in which each independent variable consisted of Control and Treatment groups. Initially, a One-Way Analysis of Variance (ANOVA) was used as statistical test, as it was commonly

used in situations where the sample consisted of more than 2 groups. However, further examination of data in the treatment groups' scores (as assessed by Levene's test for equality of variances (p= .000)) revealed that the assumption of homogeneity of variances was violated, which is indicative that the dependent variable (pre-test scores) was not equal between the 3 independent variables (DDM1 Vietnam, DDM2 Vietnam, DDM2 Melbourne). This inequality was partly attributed to unequal group sizes, in which the DDM2 Melbourne sample was comparative smaller than DDM1 and DDM2 Vietnam. Essentially, this inequality between groups can affect the Type 1 error rate and as such, the one-way ANOVA was not used as statistical analysis, but rather, separate paired sample *t*-tests for each group was conducted to compare if there were any significant mean differences between pre-test and post-test scores of all the control groups and treatment groups for each cohort of students. Conducting the separate paired sample *t*-tests was also more feasible for the context of this study, as the aim was to determine if there was a performance improvement between pre/post-test scores (mean difference), rather than a comparison of performance improvement between groups.

Another limitation is the learning methods between control and treatment groups may not have been a fair comparison. As control group students were limited to only traditional review methods (face-to-face instruction, self-review of lesson materials in class), the students in treatment groups reviewed their lessons in games, which arguably would be a more enticing and novel way of learning when compared with traditional modes of learning, thus possibly affecting the post-test outcome. Ideally, other modes of learning could be incorporated into the experiment, such as video tutorial reviews, e-learning modules, etc., to make a broader comparison between different modes of learning to determine if digital RPGs is a more effective tool for learning digital media courses. Due to small class sizes and limited access to students and lecturers however, additional modes of learning was not incorporated into the sample groups.

As previously mentioned, the use of games digital media courses is a novel way of learning when in comparison with traditional teaching and learning methods. Students' feedback in post-

game opinion-based survey and focus group interview about the effectiveness of *Virtual Designer* as a learning tool was generally positive, but it is imperative to account for the game being a novelty to students and consider if students interest is still sustained after an extended length of time. Further testing could be conducted to determine if students' perception towards the game still remains positive during the interim and at the end of the semester. Due to limited resources and limited access to students on both campuses, the pre/post-test experiment was conducted on one occasion per cohort of students.

6.7 Summary

Chapter 6 presented the research procedures and results of Study 2, where students completed pre and post-tests, opinion-based surveys and participated in focus group interview to provided input on the feasibility of *Virtual Designer* as an effective learning tool. Chapter 7 will present research procedures and findings from Study 3, where lecturers play-tested *Virtual Designer* and provided qualitative feedback on the feasibility of the game as a learning tool to accomplish learning outcomes of digital media courses, from the educator's perspective.

7 Study 3: Evaluating the Impact of *Virtual Designer* (Lecturers)

7.1 Introduction

Chapter 6 presented the research procedures, data analysis and findings of Study 2, where digital media students played *Virtual Designer* within classroom environments. Through a pre-test and post-test experiment setup, paired-samples *t*-tests results indicated that both treatment groups (students who played *Virtual Designer*) of Design for Digital Media 1 (DDM1) and Design for Digital Media 2 (DDM2) students experienced statistically significant performance gain in post-test scores. DDM 2 students based in Australia however did not experience significant performance gains in post-test scores after using *Virtual Designer* as a learning tool. Feedback received through opinion-based surveys and focus group interview have indicated an overall positive opinion on the learning effectiveness using *Virtual Designer* and an agreement on the feasibility of digital RPGs as a learning tool for digital media education.

This chapter will describe data collection procedures, data analysis method and findings of Study 3. This is a follow-up interview of Study 1 (Chapter 4) that was conducted in the early phase of this research, where lecturers discussed teaching and learning challenges and identified desirable learning outcomes of digital media courses. Collected lecturer inputs were taken into consideration during the game design and instructional design phases of *Virtual Designer*. In Study 3, lecturers played *Virtual Designer* and provided qualitative input on the overall feasibility of the game as a teaching and learning tool for digital media courses. Combined feedback from both students and lecturers will enable a more conclusive finding.

As presented in Chapter 3, Study 3 aims to answer the following research questions:

Could digital RPGs be implemented in classrooms as an effective learning tool for students to accomplish learning outcomes of digital media courses?

Which types of learning outcomes in digital media courses could best be supported through digital RPGs?

What features or elements of digital RPGs could be used for students to accomplish learning outcomes and overcome learning challenges in digital media courses?

7.2 Participant Characteristics

Although 12 lecturers participated in Study 1, the sample size for Study 3 is considerably smaller, with 3 digital media lecturers participating. The drop of numbers in sample size was due to an unanticipated staff turnover in the university, which occurred during the final stages of this study. Some lecturers were also unavailable for play testing during that period due to sabbatical leave. All 3 lecturers in Study 3 are based in Vietnam and have participated in Study 1. They meet the selection criteria outlined in Section 4.2 and participation was voluntary. All lecturers spent approximately 60 minutes using *Virtual Designer* and completed all the tasks in the game.

7.3 Data Collection Method

Like Study 1, semi-structured interviews were conducted with participating lecturers. An interview guide was used in Study 3, serving as a checklist for the researcher to cover relevant points of discussions. The interview guide (see Appendix 7) is divided into 3 sections, with each section consisting of 3-6 questions. Table 54 reiterates the descriptions of Sections [A] – [C] of the interview guide:

Interview Guide Sections	Description
[A] Feedback of *Virtual Designer*	Having played *Virtual Designer*, lecturers will provide feedback on their overall experience about *Virtual Designer*.
[B] Learning Outcomes	Lecturers discuss their opinion about the instructional design of *Virtual Designer* and whether the game objectives are adequately aligned with desirable learning outcomes of digital media courses.
[C] Feasibility of Digital RPGs as Learning Tool	This section will contains questions relating to lecturers' views on the feasibility of using digital RPGs as a teaching and learning tool in class.

Table 54 - Study 3 Interview Guide Sections

7.4 Discussion Points

The questions in the interview guide will cover 3 key discussion points – feedback of *Virtual* Designer, learning outcomes, and feasibility of digital RPGs as a learning tool, which will form the main categories of the coding frame structure in the data analysis process.

Discussion Point 1: Feedback of *Virtual Designer*

Lecturers will provide feedback about their experience of playing *Virtual Designer* and discuss the overall game design and learning design, as well as general usability of the game. Lecturers will also elaborate on issues they have encountered whilst playing the game.

Discussion Point 2: Learning Outcomes

Lecturers will provide feedback on whether game objectives of *Virtual Designer* adequately met the educational objectives of the game – and whether desirable learning outcomes of digital media courses were met through playing the game. Lecturers will also discuss if the difficulty level of the game was adequate in assessing students' knowledge of design.

Discussion Point 3: Feasibility of Digital RPGs as Learning Tools

Lecturers will discuss the feasibility of using digital RPGs as teaching and learning tool to accomplish desirable learning outcomes of digital media courses. Lecturers will elaborate on how digital RPGs could potentially be implemented into their courses and improvements or features that could be added into future RPGs for better alignment with learning outcomes.

7.5 Data Collection Procedures

The semi-structured interviews were conducted via videoconference on Skype during Semester 1, 2016. Participating lecturers received a consent form and a copy of the interview guide 2 weeks before the scheduled interview, along with a web link to download *Virtual Designer*. Prior to the interview, lecturers spent 60 minutes using *Virtual Designer* and completed all main scenarios and side-missions in the game. The interview sessions averaged at 30 minutes in duration. All sessions were audio-recorded and transcribed verbatim to be used as a source for data analysis.

At the beginning of each session, lecturers were provided with an overview regarding the outcome of Study 1 and how their input during the early phase of the study were implemented

into the development of *Virtual Designer.* Questions in Sections A, B and C of the interview guide (see Appendix 7) was asked. Some responses were probed further with follow-up questions, enabling lecturers to discuss and elaborate on their responses with further depth. At the end of the interview, lecturers were prompted to provide any additional feedback about the game.

7.6 Data Analysis Procedures

Study 3 uses the same data analysis procedures as Study 1 (Section 4.6), in which a qualitative content analysis method was used to identify themes and establish meaning of the interview data. Interview transcripts were organised in Nvivo and a coding frame was constructed. Like Study 1, text data were segmented into coding units in Nvivo. This was completed in 3 separate phases (trial coding and pilot coding), before the main analysis phase was subsequently conducted. A full description of data analysis procedures has been described in Section 4.6.

7.7 Findings

7.7.1 Feedback of Virtual Designer

Lecturers were asked to describe their experience of using *Virtual Designer* and discuss positive or negative feedback about the game.

"The first one covering something, had some hands on thing which is nice, you found a way to make it possible, like to apply printing theory, I thought that was really quite good. In a way in the beginning I thought it was vocabulary but it was that also, that's cool, it would be nice if there could be more of that kind of stuff, but I guess in a game kind of situation it wouldn't be that easy, but yeah, it covers all the aspects, you managed to introduce a bit of creativity thinking, which is good, yeah." **[L1]**

In designing *Virtual Designer,* considerations were placed to ensure authenticity of tasks and scenarios to simulate a believable real-world experience. Lecturers regarded the in-game scenarios as a believable depiction of real-world situations confronted by design practitioners. All 3 lecturers regarded Main Scenario 3 in particular as a convincing scene. In this scenario, the player selects and pitches a logo design to 2 clients in a boardroom. A poor performance will result in displeased clients in the scenario outcome. L3 considered the scenario an accurate depiction of situations he himself has previously faced as a design practitioner when dealing with clients:

"…There's one guy who wasn't happy with his logo, I've been through some similar situation like that you know, I think, you know – the client who are kinda polite with you all throughout the meeting and then after the meeting go, you know, we're not happy? You know, that's stuff that you would experience, that I've experienced, I think stuff like that is pretty good. It feels authentic, I was like, ok, this is something I've experienced before at agency." **[L3]**

L2 appreciated the conversational style of the characters, and described that the unpleasant responses received from characters as an accurate depiction of client expectations in real-world settings:

"*...the way they talk, they way they responds, sometimes if it's the wrong answer they were a little bit tough, so I did both, you know, to try - I think that's quite good, because it gives you a sense of, it's not going to be – they're not your friends, you know, they're professionals and they expect something so I think that was really good, and if you did a good job it was more – rewarding too, so I think that was good, it's probably one of the parts that was the most convincing."* **[L2]**

Similarly, L1 commented on how he enjoyed the dynamic reactions and exchanges with clients in Main Scenario 3, describing it a rewarding experience:

"I think I really like the reaction and the exchange with the clients. The way they respond feels a little bit friendly or threatening, it gives you a sense of rewarding. It meets the objective, if you develop it further I'd like to see a second level or something." [L1]

7.7.2 Challenges - Difficulty Level

In Study 2, 14% of students (Section 6.3.4) regarded *Virtual Designer* as being too difficult and they were unable to complete the in-game tasks satisfactorily. The game assumes prior knowledge – design theories students have learned in DDM1 and DDM2 classes, and the scenarios' content was based on lesson materials used by lecturers in class. The lecturers in Study 3 were asked to verify if they find the difficulty level to be adequate for DDM1 and DDM2 standards. A general view by lecturers was the difficulty level of the tasks was fair. L1 for instance confirms that students ought to perform satisfactorily in the game without difficulty - provided they have reviewed the design theory topics in class:

"*No, not too difficult, no. I think if you know your topic, you should know. At first I was thinking it was too easy and wasn't paying attention, and that it's me. If you have been working in class and review the topic, the difficulty level is ok."* [L1]

L2 shares the same view, but suggested that perhaps it was due to a lack of clarity in the game objectives (rather than lack of prior knowledge) that causes students to underperform the in-game tasks of *Virtual Designer*:

***"… the difficult thing might not be the task, but perhaps the understanding on what you're looking for, I got a bit confused with the colour theory task, so that could be a reason, but I didn't find it that difficult…"* [L2]**

L2's view reaffirms the student feedback obtained in Study 2 (Section 6.5.5), which described that the lack of clarity in objectives of the game has negatively impacted their learning experience. Similar with L3, L2 suggested that the tasks be presented in incremental steps so students could be eased into an appropriate difficulty level as they progressed through the game:

"I think for me, I would put it somewhere in between, not terribly difficult or terribly easy, somewhere in between. I would make it in levels, where you graduate in different levels, start off very basic." **[L3]**

7.7.3 Feedback Issues

An issue identified by lecturers was the lack of feedback in the game, resulting in confusion or frustration during the game play experience:

"I was like why I did it wrong here, I was thinking I was correct, And I was – I cannot check, and maybe that's why I didn't continue. I understood at the end we need to go further." **[L1]**

"The only issue is not having the answers, it's a bit frustrating, but oh, what I did wrong, score is fine, but you want to understand where you did it wrong at an educational level." **[L2]**

Reiterating Section 6.5.5, digital media students in Study 2 have identified the lack of feedback in the game as an issue in determining the correct answers. This issue was also raised during the focus group interview session with students in Study 2. As discussed, the only forms of feedback to gauge performance are responses of the characters, the scenario outcomes and a score sheet at the end of the scenario. Although the intention of excluding these answers was to enable students to reattempt scenarios and obtain answers through a self-discovery process

(thus also increasing playability of the game over a longer period) - lecturers have agreed that this lack of feedback will likely prevent students from learning through their mistakes. To overcome this, L2 suggested the game be programmed to dynamically change its level of difficulty, depending on students' performance. In addition, the game could also provide tips to guide students as they walkthrough the scenario:

"Maybe it's the feedback – if they fail, then give them tips, then they will be able to be progress without going over and over to get the right answer. Maybe that would be a way of improving, if you fail you get a bit of tips, but play again but narrow down the options and get that bit so they have the feedback to find the right answer. Then they wouldn't feel frustrated, then they will be able to find the answer." **[L2]**

7.7.4 General Gameplay and Usability

The game environment of *Virtual Designer* was designed as a simulated studio, where interacting with non-playable characters will trigger conversations and entering different sections of the studio will initiate the main scenarios (where students may choose whether to proceed). The intention of including this feature is to provide students with a sense of control in managing and controlling their game activities to increase students' motivation in learning (Garris et al. 2002) (Section 5.3.4.5). Lecturers however find the lack of definitive structure in the game to be confusing. L3 and L1 remarked that it wasn't apparent what they were supposed to do in the game, due to the lack of clear instructions.

"When I first started the game, the hardest thing for me was what was it to experience, I wasn't sure if I was supposed to talk first, I don't know that was the gaming experience or am I supposed to walk around and try everything or not. I probably spent like a good 5 minutes walking around those people to see if something happened. That was the only drawback, it wasn't clear the instructions, what were these people standing around there." **[L3]**

"As a non-player I would say - At the beginning I was a bit lost, not too sure if you haven't explain to me by writing down something, I was not too sure where to go at first..." **[L1]**

Both lecturers' comments overlap with students' remarks on the overall lack of clear objectives in the game (Section 6.3.4), thus being unsure about how to proceed. In designing the game, the earlier assumption was students will engage with game tasks through self-exploration within the environment. Given this feedback from both lecturers and students – a set of instructions could be made available at the initial start of the game, along with an outline of objectives for each task to eliminate confusions.

Some students struggled with game controls in Study 2. L3 commented about having some difficulty navigating the keyboard controls and attributed that to his unfamiliarity with video games.

"I had a little bit but not too much, but that's probably I don't play games a lot , but maybe for a kid that plays a lot of video games. I was a little clumsy with that." **[L3]**

"…the interface, the fact we could use camera movements, it's easy to go around to understand where to go and what you do." **[L2]**

L1 and L2 did not face difficulties with using the controls within the game. The controls however could be revised for better intuitive use so it caters all users.

7.7.5 Feasibility

On feasibility of using digital RPGs for teaching digital media courses, all 3 lecturers expressed favorable views and agreed that digital RPGs would make a good learning tool for students. L2

emphasised that the use of digital RPG would be complementary with other existing learning tools and in-class activities:

"Yeah I think so, yea I would use it in my class. It's just one other tool for them to learn, it's not the only tool for them to learn. And all the activities like we work together on creative design or something – that's what I mean, any game has a world on what you could put in, this one helps expand their knowledge and let them experience what is the key things in experience." **[L2]**

As described in Section 5.3.5, *Virtual Designer* was designed as a supplementary learning platform that could be used alongside existing modes of teaching within a blended learning environment. While the proposed conceptual framework (Section 5.3.3) is inclusive of 9 Bloom's Taxonomy categories for proper alignment of game tasks with desirable learning outcomes, it should be acknowledged that not all learning objectives could be met through RPG gameplay due to constraints in game environments. For instance, the Organisation category of the affective domain, which refers to students' ability of creating their own value system through comparing and relating on different values (Krathwohl et al., 1973) is difficult to achieve through game characteristics of digital RPGs and perhaps could be better achieved through live discussion or debates in class.

As L2 noted, the digital RPG would be useful in enabling students to further their knowledge by experiencing scenarios within the game environment, which would otherwise be difficult to simulate in class.

"I think the result will be more positive than if you learn and ask them to do the quiz, I think you'll get the gaps of error, but if it's coming from games, I think we'll get better performance, I think so. It's fun, it's pleasing, it's entertaining, it's like a game - they are engaged – you are learning in fact, experiencing and learning at the same time. In the lecture, they are learning at one ear but they are not experiencing. I think it's very

interesting, they should have 30 minutes of doing it, and at this stage I'm quite sure, they will be focused." **[L1]**

L1 commented on the engagement factor that digital RPGs as a beneficial aspect towards students' learning. In Study 1, lecturers have described students as passive learners and one of the teaching challenges was to sustain students' interest on the subject matter. As L1 described, digital RPGs would be an ideal alternative to lectures, where lecturers deliver the lessons – and students passively receives the information. Instead, students could be engaged through active participation on the learning tasks embedded in digital RPGs, temporarily shifting from a classroom context to one of a (simulated) workplace.

L1 commented on the engagement factor in playing digital RPGs as a beneficial aspect towards students' learning. In Study 1, lecturers have described students as passive learners and one of the teaching challenges was to sustain students' interest on the subject matter. As L1 described, digital RPGs would be an ideal alternative to lectures, where lecturers deliver the lessons – and students passively receives the information. Instead, students could be engaged through active participation on the learning tasks embedded in digital RPGs, temporarily shifting from a classroom context to one of a (simulated) workplace.

"I probably have to play it at home instead of the classroom, or maybe when I do the basic stuffs, the colour wheel, the composition, framing, the basic stuffs, then yeah that could be good as a class exercise, that would probably be useful being done at home." [L3]

7.8 Summary

This chapter has presented the data collection methods, procedures and findings of Study 3. Lecturers' overall perception on *Virtual Designer* was positive, with all 3 lecturers agreeing that digital RPGs would work as feasible tools to accomplish learning outcomes of their courses.

Lecturers however noted usability issues. The lack of feedback and clear objectives has also been highlighted as an issue. Lecturers recommended that difficulty level of tasks be varied to adapt to different students' ability or proficiency level in the subject area. Chapter 8 will discuss combined findings of Studies 1, 2 and 3.

8 Discussion and Conclusion

8.1 Introduction

This research began with 1 primary aim:

To converge the pedagogical benefits of role-playing, educational technology and digital games to investigate the effectiveness of using digital RPGs in classrooms to achieve learning outcomes.

In achieving this aim, research questions were formulated and 3 studies were devised. The output was the development of a 3d digital RPG called *Virtual Designer,* in which its design was informed by input from digital media lecturers. The game was also implemented in a classroom environment, where Design for Digital Media 1 (DDM1) and Design for Digital Media 2 (DDM2) students play tested the game. Using pre/post-test scores, performance gains were measured to determine if the playing digital RPG increases students' theoretical and practical test performance, compared with students who used conventional methods. Students also provided qualitative feedback through surveys and focus group interviews, offering their views of the learning effectiveness of *Virtual Designer* and the feasibility of using similar digital RPGs for digital media courses. 3 lecturers play tested the game and participated in interviews, offering the educator and practitioner's perspective on whether or not the tool will be effective in accomplishing learning outcomes and overcoming teaching and learning challenges typically encountered in digital media classrooms.

In this final chapter, the combined findings of Study 1 (Chapter 4), Study 2 (Chapter 6) and Study 3 (Chapter 7) will be presented and discussed to address the aim and research question of this study. The contribution of this study will also be discussed, along with limitations and areas that could be considered for future research.

8.2 Summary of Results

From the lecturers' point of view (Section 4.7.3), the 3 biggest learning challenges students faced when studying digital media courses are: (1) articulating works using the design vocabularies, (2) applying design theories and (3) conceptual skills. In addition to these learning challenges, lecturers regarded student attitude to be an issue, as students are often passive in classroom and lacked motivation or interest in the subjects taught in classrooms. 45.3% of students disagreed (Section 6.5.1) when asked if they were able to apply design theories into their own projects. This is consistent with lecturers' views in Study 1, with lecturers identifying the same issue as one of the top learning challenges. Similarly, students are also uncertain about their proficiency in speaking with the design vocabularies (50.5%), once again consistent with findings collected from lecturers in Study 1.

According to lecturers, the 3 most desirable learning outcomes are (1) gaining solid theoretical knowledge, (2) good proficiency in design language and (3) ability to apply knowledge into different contexts and situations. In developing a digital RPG that meets these identified learning outcomes, a conceptual framework was developed, which linked RPG game mechanics, game characteristics (Garris et al. 2002) and selected categories of Bloom's taxonomy. In validating this conceptual framework, the developed game, *Virtual Designer*, was played-tested by students and lecturers of the Digital Media program of both Vietnam and Australia campuses.

Pre/post-test scores were collected from students before and after they play-tested *Virtual Designer* in class. Students were divided into control group (conventional teaching and reviewed methods) and treatment group (using *Virtual Designer*). Paired samples *t*-test scores (Section 6.2.2.3) indicate that DDM1 and DDM2 students in Vietnam experienced statistically significant performance gains in post-test scores [DDM1 (9.333, (95% CI [5.416, 13.251), $t(44) = 4.802$, $p = .000$, $d = 0.71$)], [DDM2 $t(38) = 3.273$, $p = .002$, $d = 0.52$]. The Melbourne campus students of DDM1 however did not experience significant performance gains, there were no

mean differences between pre-test (*M* = 77.06, SD = 16.494) and post-test scores (*M* = 77.06, SD = 16.494) of treatment group, and no mean increase was observed in the post-test scores of treatment group – 0, 95% CI [-7.495, 7.495].

3 lecturers play-tested *Virtual Designer* and provided feedback on the use of digital RPG as a teaching and learning tool. All 3 lecturers regarded *Virtual Designer* as a feasible educational tool to accomplish learning outcomes of their courses and agreed that similar digital RPGs could be developed for design education. Usability issues in *Virtual Designer* was reported and lecturers recommended that the level of difficulty in digital RPGs be varied to be adaptive towards students' proficiency and ability level in different subject areas.

8.3 Research Question Revisited

Section 4.8 and Section 6.5 have discussed the findings that answered the pertaining secondary research questions. In revisiting the primary research question:

Could digital RPGs be implemented in classrooms as an effective learning tool for students to accomplish learning outcomes of digital media courses?

From a statistical performance-gain point of view, although *t*-test results of both class groups in Vietnam indicate that the use of *Virtual Designer* increased students' performance in theory and practical tests, given that the Melbourne students did not experience any increase of test scores after playing the RPG, we are not able to conclude that digital RPGs are effective learning tools to increase theoretical and practical test performance. However, as addressed in Section 6.2.2.3, the difference in *t*-test results may be attributed to learner differences of student cohorts in both campuses. The student cohort in Vietnam primarily consisted of Vietnamese students who were non-native English speakers. In Study 1, lecturers have also reported Vietnamese students as being passive in class due to difficulties transitioning into a university-learning environment that contrasts strongly with their previous learning experience in Vietnamese high

school environments. As such, the *t*-test result of Vietnamese students experiencing significant performance gains in their post-test scores after playing *Virtual Designer* may be indicative that digital RPGs are beneficial in overcoming barriers of learning experienced by second language English users or passive learners. Further studies will need to be conducted for more conclusive findings on this phenomenon.

On the qualitative end, when students were asked to evaluate the learning effectiveness of playing *Virtual Designer*, the self-perceived learning benefits have been generally positive. Knowledge-gain (18%), gameplay (18%) and real-world experience (16%) has been amongst the most cited positive response collected from the opinion-based survey, which is indicative that students find the game to be a useful platform to experience the real-world workplace and apply their design theory knowledge into hypothetical scenarios. In reinforcing the idea of "*performativity*" (Gilbert 2007) discussed in Section 2.2.2, this feedback is indicative that digital RPGs could be used as effective platforms for students to acquire professional knowledge within the constraints of the classroom – and in doing so, actively apply and adapt their knowledge into new situations that are grounded in (simulated) reality.

Students find that the main scenarios and cut-scenes gave them a real-world work experience. This is consistent with lecturers' views, which find the main scenarios to be one of the most interesting features of the digital RPGs, as the narrative and dynamic character expressions and feedback were accurate representations of reality in the working world. This reaffirms the discussion on game narratives in present literature – when embedded into learning environments, players could act through the perspectives of characters they could relate to, thus create meaningful experiences (de Freitas and Maharg 2011).

Based on student and lecturer feedback, digital RPGs may not be ideal for gaining knowledge, but serve better as a platform to assess and recall prior knowledge learned in class. Due to its exploratory nature, tasks and objectives are often ill-defined. Some students find that this

feature of RPGs as being confusing and preferred a more instructional approach in the game, where feedback and objectives are clearly stated.

From an engagement point of view, findings from Study 2 have indicated digital RPGs are very immersive and encourage students to engage in learning through active involvement in learning. Fidelity (24%) was one of the most commonly mentioned positive aspects of the *Virtual Designer*, which is indicative that the high-fidelity graphics in the game increased visual appeal and added towards students' game-playing experience. Lecturers agreed that this form of learning would be a good alternative to lectures or traditional media given its immersiveness, though concerns of novelty have been brought up on several occasions during the interview.

8.4 Contribution of Study

The present literature indicates a lack of serious games that falls into the genre of RPG. This study investigated how key RPG characteristics such as role-play, non-linear narrative, character growth could be applied to create a safe learning environment for students to role-play and apply their knowledge as digital media practitioners in a simulated workplace environment. Existing frameworks of educational game design, such as the Game Object Model (Amory 2007) or Experiential Gaming Model (Kiili 2005) draws upon constructivist theory to link pedagogical goals with game elements. Kiili's Experiential Gaming Model (2005) in particular emphasised on increasing the flow experience through gameplay and experience learning. The "design cycle" of the model is described abstractly - as it is dependent on the genre of the game. Essentially, these frameworks serve as generalised frameworks for generic educational game design without a defined genre. Yet, game mechanics and attributes often tend to be genre-specific. There are currently no serious games frameworks available in the present literature tailored specifically for the design of digital RPGs. Key to the genre of RPGs for example is the narrative element, character role-play, open world exploration, etc. Factoring these genre-specific attributes into the game design process would ensure game mechanics that best align with specific instructional goals are applied in the learning design of the game. In

this study, selected Bloom's Taxonomy (Bloom et al. 1956) categories, game attributes (Garris et al. 2002) and RPG game mechanics were linked cohesively together to develop a new conceptual framework (see Figure 11) for the game design and instructional design of digital RPGs to accomplish identified learning outcomes. This is a generalised framework that could be adapted and used as a framework for future development of digital RPGs of different subject areas with similar learning goals. The aim of this conceptual framework is to frame the design of digital RPGs, in which in-game tasks are designed with a strong alignment of game engagement (Garris et al.'s (2002) game attributes), instructional goals (Bloom's Taxonomy categories), RPG game mechanics to achieve desirable learning outcomes. The framework is also flexible enough to be adapted for courses with different learning outcomes, in which suitable game mechanics, attributes and Bloom's taxonomy categories could be selected and used to frame the instructional design of the game. This conceptual framework was tested in the context of digital media education, through the development of *Virtual Designer*, in which the instructional design and mechanics of the game were based upon alignment of educational goals with the use of Bloom's Taxonomy categories and learning outcomes identified by digital media lecturers in Study 1 (Chapter 4).

Virtual Designer was developed entirely from the ground up and tailored specifically for digital media courses. The game targets specific learning outcomes of digital media courses, based upon university course guides and valuable input from experienced digital media lecturers. It is an original contribution in the field of serious games, as present literature does not indicate any similar role-playing games (or games in general) developed for the purpose of digital media education (Connolly et al. 2012, Mayer et al. 2014). Chapter 5 offered detailed insights on the many design considerations and rationale made during the development process of *Virtual Designer*, such as interface design, instructional design, game objectives, in-game narrative, voice-acting, look and feel, etc. These insights could serve as a design reference for educators, game designers and instructional designers that are developing similar digital RPGs for teaching and learning purposes.

In addition to developing a new conceptual framework and testing the framework through the full development of an original digital RPG, this study furthered it's contribution by implementing

the use of *Virtual Designer* in classrooms as a means of gathering empirical evidence to determine the learning effectiveness and feasibility of using digital RPGs to achieve learning outcomes. In doing so, both quantitative and qualitative data were collected to measure statistical performance gain (pre/post-test) and student feedback (focus group interviews, surveys). The combined data produced several interesting and unexpected findings. For instance, *t*-test results suggested that the use of *Virtual Designer* might bring more learning benefits for second language users and passive learners in class.

Also, although students generally agreed that digital RPGs like *Virtual Designer* could feasibly be used as an engaging learning tool to reinforce knowledge acquired in class, students prefer learning objectives, instructions and feedback of in-game tasks to be explicitly explained throughout the gameplay, as they described confusion and frustration on not knowing their progression of the game. In *Virtual Designer*, these learning instructions were kept to a minimum to mimic the open and exploratory nature of typical RPGs, and also as a well-intended design decision to maintain engagement and avoid disrupting the immersive gameplay. As such, not all attributes of RPGs may be suitably adapted for a serious game environment; the balance between game objectives and learning objectives embedded within a digital RPG should be investigated in future studies.

Another novel contribution of this study is the use of varied data collection sources, which involved lecturers and students as participants from campuses of the same university, in 2 different countries. This resulted in different *t*-test results between both campuses, which suggested that learner differences (native/non-native speakers, passive learners, previous high school learning experience) may impact the extent of learning benefits gained from playing digital RPGs. The implementation of *Virtual Designer* in classrooms of the Vietnam campus was also a unique contribution in it's own right, given that the present literature indicate little studies on the use of digital game-based learning in university classrooms situated in Vietnam. Feedback from surveys and focus group interviews in Vietnam indicated a positive acceptance of using games for learning, with some students commenting that they have yet to experience

playing a game like *Virtual Designer* in classes and find that it is a beneficial tool to improve their proficiency in the subject area.

Connolly et al.'s (2012) literature review on computer games and serious games examined 129 papers on digital games from 2004-2009. In reviewing data collection methods of serious games research, most studies used only students as participants. Only 2 studies involved lecturers – one study (Wijers et al. 2008) involved 5 lecturers in pilot testing; while in another study (Lindh 2008), 6 lecturers play-tested a computer-based business simulation game and participated in interviews. In this study, in parallel with student input, lecturer input was also gathered. Unlike previous studies, involvement of lecturers extends beyond play-testing and providing feedback - lecturers were also involved in the design of the game itself before development commenced, as they provided input on desirable learning outcomes, useful RPG mechanics that could feasibly be adapted for digital media teaching, feasibility for its use in classrooms and suggestions on possible in-game tasks. The rich feedback elicited from lecturers in Study 1 essentially informed the instructional design of *Virtual Designer*, ensuring game objectives and educational objectives are in direct alignment with the desirable learning outcomes and teaching challenges presently faced by digital media lecturers.

The combined data collected from lecturers and students presented comprehensive and objective findings on the learning effectiveness and feasibility of digital RPGs from both the educators' and learners' perspectives, which the present literature currently lacked. This data collection approach has also revealed agreements or contradicting opinions between both participant groups. For instance, students regarded that the tasks of *Virtual Designer* as being too difficult, but lecturers perceived the game difficulty as adequate and on par with their teaching expectations.

Lastly, given that there is very little research surrounding the pedagogy of digital media education, the interviews in Study 1 and Study 2 also successfully captured unique insights on

the present teaching and learning challenges faced in digital media courses; and how students and lecturers typically overcome these challenges in their teaching and learning experience.

8.5 Limitations

The sample size for Melbourne DDM2 students were considerably smaller than the cohort of students in DDM1 and DDM2 Vietnam (17 Melbourne students in treatment group, as opposed to 39 in DDM2 and 45 in DDM1), due to timing of semesters between both campuses. This may have impacted the *t*-test scores of the students in Melbourne. Due to limited access to students and class resources, the gameplay session was short. Ideally, the game should be tested on several time intervals throughout the semester (beginning, middle and end of semester), to allow more time for students to use and benefit from the game. This also takes into account of the novelty factor of using games as a learning tool, as it will be interesting to re-evaluate students' feedback to investigate if interest on the game is still sustained at the later part of the semester.

Despite best efforts in developing a 3d digital RPG within the time and budget constraints, there were some limitations with *Virtual Designer*. *Virtual Designer* was designed with only limited number of main scenarios (3) and side missions (3). The scope of learning content embedded into the scenarios and tasks did not sufficiently cover the breadth of knowledge students have already acquired in previous classes. There were also issues reported by students and lecturers in the game design, such as momentary audio glitches, usability issues and a general lack of instructions or feedback built into the game - in part an oversight on this author's part, which were too late to rectify when the errors were discovered. These issues were mildly disruptive to students' experience whilst they play the game and may have impacted their learning and general views of their game-playing experience.

Only 3 lecturers participated in Study 3 (as opposed to 12 in Study 1). As previously described, this was due to an unanticipated staff turnover that occurred in the university when this research

was in its final stages. As a result, the collected feedback and findings in Study 3 was comparatively smaller than Study 1. Although participating lecturers gave essential input, the findings of this study will be more conclusive if more lecturers were to participate in the post-game interview.

8.6 Future Research

As previously discussed, data collection of this study was conducted in 2 campuses of a transnational university based in Australia and Vietnam. *Virtual Designer* is a unique game designed specifically for digital media education. Based on present literature, there are currently no digital RPGs designed for this purpose. As such, following this research, this game will be implemented and tested in other universities to gather further empirical evidence on its learning effectiveness and feasibility as a teaching and learning tool for undergraduate programs with similar learning goals. This author will also investigate the long term learning effects of using digital RPGs for digital media education. As previously described, due to limited access to students, students have only play-tested the game at the beginning of the semester in one short session. The novelty effect of games for learning may have resulted in students favouring the use of *Virtual Designer.* In future studies, students will play the game throughout the semester, where new game scenarios are introduced in parallel as students progress through the semester and learn new subject matters. Data collection will be made at several intervals throughout the semester to measure if interest on using the game as a learning tool is sustained throughout the whole semester.

The findings that Vietnam students experienced significant performance gain in their post-test scores in Study 2 (while Australian students did not) warrants further investigation in future research. It will be worthwhile to categorically define characteristics of learner types that will gain the most learning benefits from the use of digital RPGs. For instance, the game could be tested on international students who may be non-native English speakers and more accustomed to different learning styles from previous high school experience in their home

countries. The learning effects of the game could also be tested on students who exhibit shyness, anxiety or passivity in classroom learning.

Revisiting feedback gathered from lecturers and students in this study - *Virtual Designer* would also be further developed to be inclusive of enhanced usability, progressive difficulty levels, clearer objectives and feedback to enable students to experience better learning through the game. New features and mechanics will be added into subsequent versions of *Virtual Designer*. For instance – requiring players to complete a prior knowledge test at the start of the game. As the pre-test scores indicated, some students received very low scores and did not demonstrate basic competency in the subject area before playing the game, which resulted in a frustrating game-play experience. As in-game tasks of *Virtual Designer* are primarily scenario based and assumes prior knowledge; a short test could be built into the game before students attempt in-game tasks. Students who fail to meet a minimum score will be referred to learning resources through the game. This will ensure students playing the game already have basic understanding of the subject matter and avoid a frustrating game-playing experience. It will also be interesting to develop a multiplayer role-playing game (MMORPG) version of *Virtual Designer* in future studies, where students and lecturers could simultaneously perform different virtual roles within the game environment for an added social and competitive experience.

Beyond the development of *Virtual Designer*, new digital RPGs could be developed for undergraduate studies of different discipline areas. Although the RPG conceptual framework developed for this study was used and tested in the context of digital media education, it is a generalised framework and could be used in the context of other discipline areas that would benefit from similar learning outcomes. Performance tests could be conducted on students after playing the game to compare the learning effects of digital RPGs on different subject areas.

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Appendix 1: Ethics Approval

Low Risk Research Ethics Approval

Project Title

Implementation of Digital Role-Playing Games in Higher Education Classrooms to Accomplish Learning Outcomes of Digital Media Courses

Record of Approval

Principal Investigator

I **request an ethics peer review** and confirm that I have answered all relevant questions in this checklist honestly.	X
I confirm that I will carry out the project in the ways described in this checklist. I will immediately suspend research and request new ethical approval if the project subsequently changes the information I have given in this checklist.	X
I confirm that I, and all members of my research team (if any), have read and agreed to abide by the Code of Research Ethics issued by the relevant national learned society.	X
I confirm that I, and all members of my research team (if any), have read and agreed to abide by the University's Research Ethics, Governance and Integrity Framework.	X

Name: Li Ping Thong.....

Date: 29/06/2015.....

Student's Supervisor (if applicable)

I have read this checklist and confirm that it covers all the ethical issues raised by this project fully and frankly. I also confirm that these issues have been discussed with the student and will continue to be reviewed in the course of supervision.

Name: Craig Stewart .....

Date: 30/06/2015.....

Reviewer (if applicable)

Date of approval by anonymous reviewer: 30/06/2015

Appendix 2: Study 1 Interview Guide

Interview Questions for lecturers

Thank you for taking part in this interview. Let me first assure you that you will remain completely anonymous and no records of this interview will be kept with your name on them.

A. Respondent Information

- Gender
- Age
- Area of specialization in design
- Years of teaching experience in higher education
- Current teaching allotments (courses they teach)

B. Learning Outcomes

1. What do you understand about the meaning of learning outcomes in the context of higher education?

2. Could you please provide examples of learning outcomes?

3. In your opinion, what are the most essential learning outcomes for digital media courses?

4. Kindly elaborate on why these are the most essential learning outcomes for digital media courses.

5. As an educator, what measures do you take to achieve these learning outcomes in the courses you teach?

6. How do you evaluate whether or not learning outcomes were successfully achieved in the courses you teach?

C. Teaching Challenges

1. What do you understand about the meaning of teaching challenges in the context of higher education?

2. Could you please provide examples of teaching challenges?

3. As an educator, what are the common teaching challenges that you face when teaching digital media courses?

4. What measures do you take to tackle these teaching challenges when teaching digital media courses?

5. Did you find that the measures you described were successful in tackling the teaching challenges? Please
explain why.

D. Learning Challenges

1. What do you understand about the meaning of learning challenges in the context of higher education?

2. Can you please provide some examples of common learning challenges in digital media courses?

3. What do you see as the biggest learning challenges students face in the digital media courses you currently teach?

4. What are the indicators which made you identify these as the biggest learning challenges your students face?

5. What kind of measures or support do you provide students to help them overcome these learning challenges?

6. Did you find that the measures and support you provided were successful in helping students their learning challenges? Please explain why.

E. Role-Playing Games (RPGs)

1. Based on your understanding - please explain what are digital role-playing games (RPG)?

2. Have you experienced playing digital RPGs before?

<If respondent answered yes, follow-up with Question 2a and 2b>

2a. What kinds of digital RPGs have you previously played?
2b. Please elaborate on the kinds of activities you have engaged in when playing the digital RPG.

3 key features of RPGs (character role-play, scenario-based tasks and non-linear narrative) will be explained to the lecturers. They will also be shown videos of RPG gameplay to indicate how these features typically work in games within this genre.

Take respondents through each feature and ask them if they think it could be potentially used to help achieve learning outcomes for Digital media courses. If respondent said yes to any of the following – probe further by asking them to elaborate with examples on how they would use that digital RPG feature in their teaching.

a. Character Role-Play
b. Scenario-based tasks
b. Non-Linear Narrative

F. Digital Role-Playing Games (RPGs) – Linking with Learning Outcomes, Teaching Challenges and Learning Challenges

1. Could an RPG be used as a teaching tool to achieve any of the learning outcomes you have previously identified?

<If respondent answered yes, follow-up with Question 1a and 1b>

1a. Please state which particular learning outcome(s) could benefit from the use of digital RPGs.
1b. Can you elaborate on how you would use a digital RPG to achieve this learning outcome?

2. Could a digital RPG be used to address any of the teaching challenges you have previously identified?

<If respondent answered yes, follow-up with Question 2a and 2b>

2a. Please state which teaching challenge(s) could benefit from the use of digital RPGs.
2b. Can you elaborate on how you would use a digital RPG to overcome these teaching challenge(s)?

3. Could an RPG be used to address any of the 3 learning challenges you have previously identified?

<If respondent answered yes, follow-up with Question 3a and 3b>

3a. Please state which learning challenge(s) could benefit from the use of RPG.
3b. Can you elaborate on how you would use an RPG to overcome these learning challenge(s)?

G. Lecturer's Roles in Using RPGs

1. In your opinion, what is the role of the teacher on the design and use of RPGs in the class?
<If respondent answered yes, follow-up with Question 1a. If respondent answered no, follow-up with Question 1b.>

1a. Can you please describe some examples of your role when students use digital RPGs in class?
1b. Please explain why you feel that there should be no lecturer involvement when students uses digital RPGs for learning in class.

2. Do you think that lecturers should be involved in the design and development of a Digital RPG which will be used in class?

<If respondent answered yes, follow-up with Question 2a>

2a. What are the kinds of contributions a lecturer could make in the design and development process of a Digital RPG? Can you please provide some examples?

Thank you very much for giving up your time to participate in this interview. Can I finally ask you if you think there is any aspect of your teaching experience in Digital media courses that has not been covered in this interview?

Appendix 3: Study 1 Coding Frame

Topic	Categories	Code	Description of Code	Example Quotes
Learning Outcomes (LO)	**Essential LOs** (Desirable learning outcomes of digital media courses.)	Theoretical Knowledge	To demonstrate good theoretical understanding on design theories.	They should understand every reason behind it – I'm using this element because of this, why I'm using this colour – there's a reason behind why they are design. There is too much in design, but if they don't have theoretical foundation, it's a problem. (L4)
		Concept	To use proper processes to generate creative and interesting ideas.	Learning how to use process in terms of coming up with ideas – brainstorming. (L3)
		Design Language	To proficiently articulate and explain design works using proper vocabularies and terminologies of design.	Also, language. For example, students that can design very well, they don't know how to express it. They have applied design principles, but they don't know how to express or say it in words – they don't know how to articulate it using design language. (L1)
		Applying Knowledge	To demonstrate good application of acquired knowledge into practical contexts and settings.	Know how to apply it into design. They are able to apply what they have learned. (L1)

		Soft Skills	To attain soft skills, such as communication skills, time management and collaborative skills.	Because everybody needs to collaborate, but some individuals, some students can be very comfortable working in teams and they should definitely develop that because later on they would take a position where they manage people or stuff like that. (L8)
		Informal Learning Skills	Informal or indirect learning skills outside class to further knowledge in the field of design.	To be able to see patterns. Whether it's visual patterns – relationships among everyday life that they apply through design responses to – goes beyond knowledge of the specific program. (L9)
	Reason LOs Essential (Why identified LO was seen as essential.)	Real-World	Students must be well prepared to meet real-world expectations in the industry.	At the end of the day we are doing visual communication in the industry. People won't expect you to just be a technician to use software, you need theory to produce good work. (L4)
		Creative Process	Students need to be aware of the proper workflow to produce original and creative works.	You cannot work within something without knowing what happened before. This has been produced – to be original – comes from origin, to be original you need to start from origin and redevelop from there. (L5)

	Measures to Achieve LOs (The measures taken to achieve LOs.)	In-Class Exercises	Provide practical exercises for students to work on in class.	What are the things you do to make sure they could come up with good content – for compositing, everyone has to get footage. (L6)
		Conceptual Depth	Added emphasis in class to guide students to make deeper considerations in conceptual depth.	I give them an idea on how to choose the specific music that will highlight more about the main storytelling, the concept of the movie. (L5)
		Milestones	Setting milestones for exercises and assignments.	So the milestone for example, the work in progress is a good one, at least it forces them to come up with something, and then with a few comments they could see. (L8)
		Critique	Provide ongoing feedback in students' work-in-progress.	I give a checklist beforehand and explain. Once they come back with the footage, I run through the footage. Critiquing. (L6)
		Examples	Provide students with relevant examples in class.	I try to use current examples, I do a lot of reading – I try to provide current examples to illustrate the ideas I try to present in class. (L9)

		Group Work	Getting students to work collaboratively through group works.	I let them work together through assignments – group assignments. They always work together in teams of 3-4. (L3)
		Process	Providing students a detailed walkthrough on proper design workflow and process.	Here I challenge them – you haven't seen the movie, you have no idea it's a comedy or whatever, you have some words and now let's try to research and pull out some understanding on this synopsis. Let's do some mindmapping. (L5)
		Others	Use of other methods to achieve LOs.	I use the PRS, the clicker, it's really good – you teach 4-5 slides – you pop up questions, you give students clicker, and you can see average overall class and see who understands it. (L4)
Teaching Challenges (TC)	**Common TCs** (Common teaching challenges lecturers faced.)	Learner Attitude	Dealing with negative student attitudes that are not conducive to effective teaching.	They are waiting too much from the lecturer to show everything, there is not really some initiative taken from them. (L5)
		Engaging Students	Engaging students and sustaining student interest in class.	They are not interested in courses - they don't feel it's relevant. (L3)

		Others	Other teaching challenges.	It's also hard to see everyone's work in progress. This semester I have 50 students, which is why I can't do it, I give verbal feedback. (L8)
	Measures to Overcome TCs (Measures taken to overcome teaching challenges.)	Assignments/Exercises	Getting students to work on creative projects, which are designed to engage them and improve learning attitude.	What I try to do is structure to find different ways to bring out creativity. Different types – say for narrative – writing projects, storytelling projects – instead of going with very basic short story or to tell a story in a very conventional way, using media to tell a story. One of the assignments is using Vine to tell a story. Tell me a story in 6 seconds. Instead of having them write it I ask them to shoot the story. (L3)
		Communicate	Explicitly discuss and explain to students.	Sometimes towards the end I'd tell them to be better in photography – not just thinking about technical things, but think about passion, when you take a photo – think about every moment is important. It's not just about technical things, but more passionate. (L2)

		Feedback	Providing constant feedback on students' work-in-progress.	Every week of 3 weeks they need to show me something, on the conceptual research phase it's just me saying yes or no, they need to send me a story, and I orient them the one that I feel has the most potential, then they need to show me sketches. (L8)
		Sustaining Interest	Changing teaching delivery approach to keep students engaged in class.	I try to find a video to talk about a certain topic – they are more interested to watch video than listening to lecture. (L5)
	Was it Successful (Measures taken to overcome teaching challenges – was it successful?)	Sometimes	Measures taken were sometimes successful.	My methods so far have it's pros and cons. Students putting a lot of effort in. But sometimes they're so not independent and kept asking for feedback. They need to be more independent and trust their creative instincts. (L7)
		No	Measures taken were unsuccessful.	It will push about 2 students but other students are not really fazed. (L6)

Learning Challenges (LC)	**Common LCs** (Common learning challenges students faced.)	Learning Attitude	Negative attitude towards learning.	They're passive, they don't see that as learning, they don't feel like they're getting info from lecturer – they feel like teacher isn't doing their part – they should be up there showing us and we just take it in. (L3)
		Articulating Works	Unable to articulate, critique and discuss works using proper design language.	The critique – there is maybe a difficulty for our students to critique – to write their opinion and discuss another piece, is it fear of being too direct? Is it fear of saying some that's not relevant? Is it a social convention? I don't know, but it's hard to you know, engage discussion. (L8)
		Conceptual Skills	Unable to generate creative ideas with conceptual depth.	The conceptual development. To be able to see the world more broadly – many of them don't have worldly experience – and some of that comes with age, but I noticed at the end, technical proficiency is not much of a problem with our students, but being able to come up with a concept that sort of multi-faceted, has different flavours is very difficult for them. (L9)
		Applying Theories	Unable to effectively apply theoretical knowledge into practice across different contexts and settings.	Let's go from specific design areas in broader sense – they learn the principles but they can't really patch it together. (L7)

		Soft Skills	Lacking soft skill abilities.	Most of them… they don't really put much effort into their time – the idea development, to them it's like… the due date is tomorrow, they'll just work on it a day before… they don't really spend much time on it. (L1)
		Theoretical Knowledge	Poor theoretical knowledge.	Also - Theoretical knowledge – they lack it. (L4)
	Measures to Overcome LCs (Measures taken to overcome learning challenges.)	Feedback	Communicate and provide feedback to students to explain their ongoing performances.	And being able to discuss them is a great way to see what works and what doesn't work. (L8)
		Assignments/Exercises	Assigning assignment tasks or exercises that will help students overcome their learning challenges.	We provide to them working materials and instructions that they have to follow and apply if they want to increase skills. (L5)
		Milestones	Setting milestones for assignments and exercises.	We have milestones, but I can only help so much for students who actually see me outside class, when they show me in class, I can only tell them, this is what I like. (L7)
		Presentations	Requiring students to practice communication and articulation skills through presentations.	The presentation was there to help them improve in communication. (L1)

		Examples	Presenting visual examples in class.	Some of it is trying to on the fly – trying to come up with examples on what I'm looking for. (L9)
		Industry	Expose students to industry expectations.	Guest speakers, so they can hear from people in the industry – exposing them to more things. (L3)
	Was it Successful (Measures taken to overcome learning challenges – was it successful?)	Yes	Measures taken were successful.	Does it help? Yes, I can see what idea they have before they do it on computer. (L1)
		Maybe	Measures taken were partially successful.	Yea I'm quite happy at the end of the day, but then it's always the same, you have the curve – the 5% that did very well, then the end of the curve that don't work. (L8)
		No	Measures taken were unsuccessful.	No. That is sometimes a challenge I face in class. (L5)

Digital RPGs for Digital Media Courses	**Achieve LOs** (Could digital RPGs be a feasible tool to achieve desirable learning outcomes of digital media courses?)	Yes	Lecturers believe that digital RPGs are feasible to achieve LOs.	Yes, definitely, I think it's more than potential, it's going to be the exclusive mode of learning of at least digital, if you don't go face to face you're going to go for that. And since the digital is becoming more and more present, definitely. (L8)
		Maybe	Lecturers believe that digital RPGs are feasible to achieve LOs, provided game was well-designed and properly implemented in class.	Maybe. If you use it as part of the exercises. It's not the main thing that they do it at home. Then maybe it's possible. (L1)
	Overcome TCs and LCs (Could digital RPGs be a feasible tool to overcome teaching and learning challenges of digital media courses)	Yes	Lecturers believe that digital RPGs are feasible to overcome teaching and learning challenges.	I think this can really work. It's a distinction that you made – it's not an eye-candy sort of trivial, just bring gaming for gaming sake just being novel – you thought about it, it's integrated and for design – it can work as an education program. (L9)
		Maybe	Lecturers believe that digital RPGs are feasible to overcome teaching and learning challenges, provided game was well-designed and properly implemented in class.	It depends on how smooth the transition is from knowledge into the game, you know. It has to be between the 2 extreme – one is it's a really boring education game, just an obstacle to overcome, vs, become so much of a game experience, they actually want to apply and then watch it. (L7)

	Role in Class (Should lecturers be involved when students play the digital RPG in class)	Yes	Lecturers should be involved.	I think so. The objective is not for them to play, there has to be a sense to avoid the novelty effect – it's part of the education, it's not to try something, it's another way of learning. (L2)
		No	Lecturers should not be involved.	I don't think the lecturer should be there at all. First is, I feel it's gonna delude the classroom environment. When you play an RPG you don't want a person right next to you. When you play games you want to have your own space. (L7)
		Maybe	It depends on context or situation.	Should lecturer be involved – it depends on the game design. (L3)
	Possible Issues (Possible issues and concerns in using digital RPGs)	Novelty	Novelty effect might wear off over time.	Depends on how good you are implementing it. Yea I think it will be useful…… can be very exciting, after a while you get used to it – there's going to be the first effect of excited – but the challenge to make the game still interesting semester after semester – when they know it, the novelty will be gone – what will attract them still? (L2)

		Quantifying	Difficulty quantifying results or whether learning outcomes successfully achieved.	For me it's definitely going to be a plus, an incentive, but then it could be just "I want to play a game" – how do you measure the outcomes? (L8)
		Rewards	How are students rewarded for achievements?	If you play games, you are always wanting to finish a level so you can go to the next level – that element of reward is important – if the student can get an instant reward after working for one hour – then they get a certain thing – they reach a certain level, or if you have a different narrative – they get diff results depending on their own skills and own knowledge – because each student have their own mindset and skills. (L4)
	Possible Digital RPGs for Digital Media Courses (Suggestions of possible digital RPGs for digital media courses)	Real-world Scenarios	Digital RPG that simulates real world tasks that places students in different hypothetical scenarios commonly faced by design practitioners.	For video you have to do research, or TVC. Let's say how to organize crew, people, how many people you need, who you need, what equipment you would choose – if you would shoot at night, what type of lighting, how much power would you need, what kind of camera would you use, casting. (L3)

		Role-Play	Digital RPG where students role-play as design practitioners and perform tasks from the practitioner's point of view and frame of thought.	If the games are able to bring them to look at this in different ways, through the games they are able to see certain ways like from a mindset of a design professional, it will be interesting – it will not be the same as classroom setting – change it to a workplace. (L1)
		Simulated Environments	Using the game environment as a virtual space where students could interact with for better learning effect.	For sound – the things I am facing – specialization – that can be improved – display some sound and how the sound move – how you turn the character and the sound works. I want to use Unity to create a virtual exhibition. (L5)
		Multiplayer	Multiplayer digital RPG with the element of competition and scoreboard to increase student engagement.	Interesting if they can compete with other students. They have to gain certain scores with other students. Within a group you can see each other scores – that will be interesting. It'll be an interactive kind of thing, not just playing by themselves. (L1)
	Contributions in Development (Contributions lecturers could make in digital RPG development)	Content	As subject matter experts – to provide recommendations on in-game content and lesson materials.	The content should be contributed by the lecturer. There's no way a game developer could do without the lecturer. (L6)
		Feedback	Provide feedback throughout different iterations of the game through game testing.	If somebody made the game we can give input – we can participate in the actual design. (L3)

		Learning Outcomes	Ensuring game objectives are closely aligned with desirable learning outcomes.	At the end of the day no matter how ugly or beautiful the game is, it serves the purpose – which is to achieve the LO. (L4)

Appendix 4: Study 2 Pre/Post-Test and Surveys

Pre-test Survey

Age:
Gender:
Year Level:
Semester:

1. I am confident of my knowledge in colour theory.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

2. I am confident of my knowledge in typography.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

3. I am confident of my knowledge in pre-flighting print documents.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

4. I am confident of my knowledge in brand identity.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

5. I am confident of my knowledge in logo design.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

6. I find it easy to apply abstract design theories into my practical design works.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

7. I do not face difficulties using design vocabularies to describe my design projects effectively.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

8. My learning experience in university provides me with a clear understanding of what it is like working as a design professional in the industry.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

9. I actively use design vocabularies during discussions with my classmates and teachers.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

10. I feel that the design theory knowledge I learn from university adequately prepares me for real-world work situations.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

12. I could easily recall the design theories I have learned from design courses in previous semesters.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

13. I am familiar with design workflow practiced in the design industry.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

14. I feel confident in using design vocabularies to communicate with design professionals in the industry.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

Post-test Survey

Main Scenario 1 (Printing)

1. This scenario enabled me to apply my knowledge of printing theory into a practical situation.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

2. This scenario tested my level of understanding in preflighting documents correctly before printing in mass quantity.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

3. The talking character provided me with clear instructions on my task objectives.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

4. I was interested in completing the in-game task successfully so I could watch the outcome of the scenario.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

5. Playing the scenario allowed me to experience real-world consequences of pre-flighting documents before printing.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

6. I find the talking character's reaction in the outcome to be a good indicator of my overall performance in the task.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

7. Playing this scenario will enable me to effectively apply pre-flighting process to my future creative projects.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

8. I find the task in this scenario to be challenging.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

Main Scenario 2 (Colour Theory)

9. This scenario allowed me to apply my knowledge of colour theory into a practical situation.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

10. This scenario tested my level of understanding in colour theory.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

11. I was interested in completing the in-game task successfully so I could watch the outcome of the scenario.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

12. Playing the scenario allowed me to experience the process of selecting colour schemes for packaging design.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

13. I find the talking character's reactions a good indicator of my overall performance in the task.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

14. Playing this scenario will enable me to effectively identify different colour schemes.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

15. I find the task in this scenario to be challenging.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

Main Scenario 3 (Pitching to Clients)

16. This scenario allowed me to apply my knowledge of typography into a practical situation.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

17. This scenario allowed me to apply my knowledge of branding identity into a practical situation.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

18. This scenario allowed me to apply my knowledge of logo design into a practical situation.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

19. The questions in this scenario required me to recall the previous lessons I have learned from design classes.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

20. The conversational responses I received from the characters kept me interested in answering their questions.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

21. The characters' reactions were a good indicator of my overall performance in the task.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

22. I was motivated to answer the questions correctly so I could watch the outcome of the scenario.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

23. I find the task in this scenario to be challenging.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

24. Playing the scenario enabled me to experience the process of pitching a design project to clients.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

25. Playing this scenario increased my confidence in pitching design projects to future clients.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

General Questions

26. Overall, I find that the game is a useful learning tool for me to practice my design theory knowledge.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

27. Playing the game allows me to identify areas of design theories that I am weak at.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

28. I enjoyed interacting with the characters in the Main Scenarios.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

29. The responses of the Main Scenario characters kept me engaged as I answered the questions.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

30. To test my knowledge in design theories, I prefer taking formal quizzes and tests than to use a digital role-playing game like this.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

31. I would be interested in playing a digital role-playing game like this to practice my design knowledge in other subject areas.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

32. I find the game to be an engaging way to practice my design theory knowledge.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

33. This game increased my understanding of standard design processes in the industry.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

34. This game allows me to gain familiarity in standard practices in the industry.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

35. This game is a good platform for me to role-play as a design professional.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

36. By playing this game, I will be able to discuss my creative decisions more effectively.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

37. By playing this game, I will be able to apply design principles to my projects more effectively.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

38. This game increased my knowledge in colour theory.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

39. This game increased my knowledge in typography.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

40. This game increased my knowledge in pre-flighting print documents.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

41. This game increased my knowledge in brand identity.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

42. This game increased my knowledge in logo design.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

43. This game increased my knowledge in pitching design projects for clients more effectively.

1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree

Open Ended Questions:

44. Please describe any positive aspects of the game.

_____

45. Please describe any negative aspects of the game.

_____

Appendix 5: Study 2 Focus Group Interview Guide

Focus Group Questions (Students):

Pre-game

1. As a design student, did you feel confident with the level of design theory knowledge knowledge that you have learned from previous digital media courses you completed in university?

2. What are the biggest learning challenges that you face when studying digital media courses?

3. What measures do you take to overcome these learning challenges?

4. Do you find it easy to understand design theories through lectures and class materials? Please elaborate why.

5. Do you find it easy to apply design theories and principles into your design works? Please elaborate why.

6. Do you find it easy to speak and write using the "design language" to describe your design works? Please elaborate why.

7. Are you still able to remember the design theories taught in classes well after a few semesters have passed?

8. Do you take any measures to improve your knowledge of design theories outside of class? Is it effective?

9. Does taking digital media courses prepare you with adequate design theory knowledge for working in the industry as a design professional? Please elaborate why.

10. Does learning in classrooms provide you with a realistic experience of what to expect as a design professional in the industry? Please elaborate why.

Post-Game

1. Was playing the game an enjoyable learning experience for you? In what aspects was it enjoyable? Please elaborate why.

2. What did you liked most about the game? Please elaborate why.

3. What did you liked least about the game? Please elaborate why.

4. Do you feel more motivated practicing your design knowledge through playing this game, compared with traditional means such as revising lecture slides, books and completing quizzes? Please elaborate why.

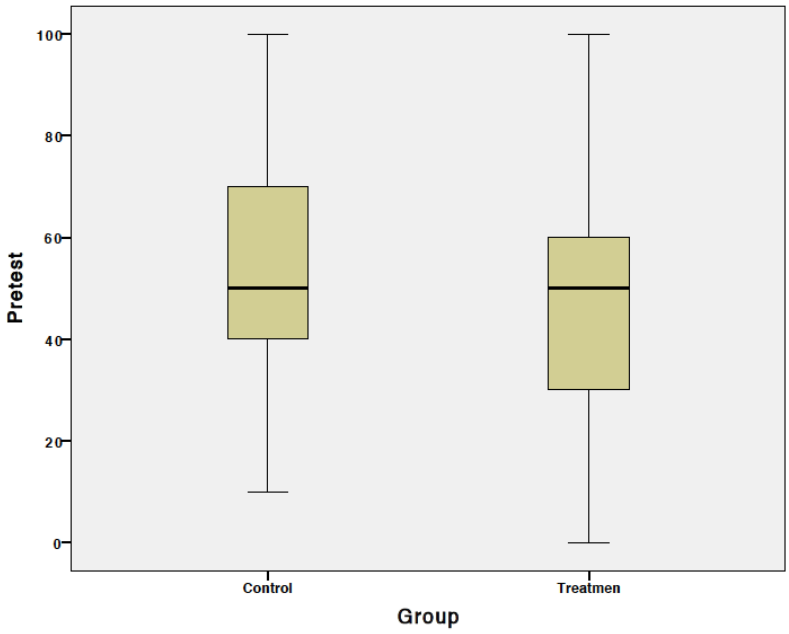
5. Did the game helped overcome any of the learning challenges you mentioned in the pre-test?

6. Which main mission scenario did you find most interesting to play? Please elaborate why.

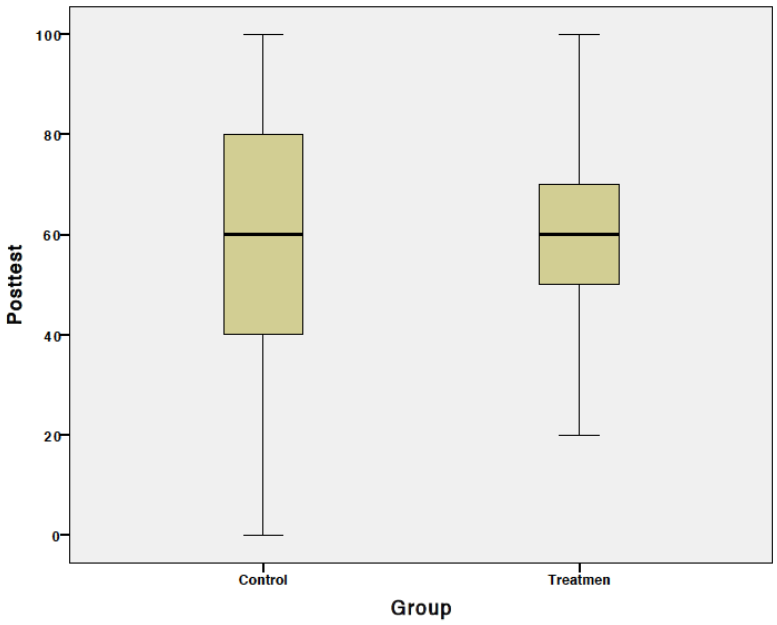
7. Do you think the game like this – a role-playing game - is a useful learning tool to practice your knowledge in design theories? Please elaborate why.

8. Do you have any other feedback about the game?

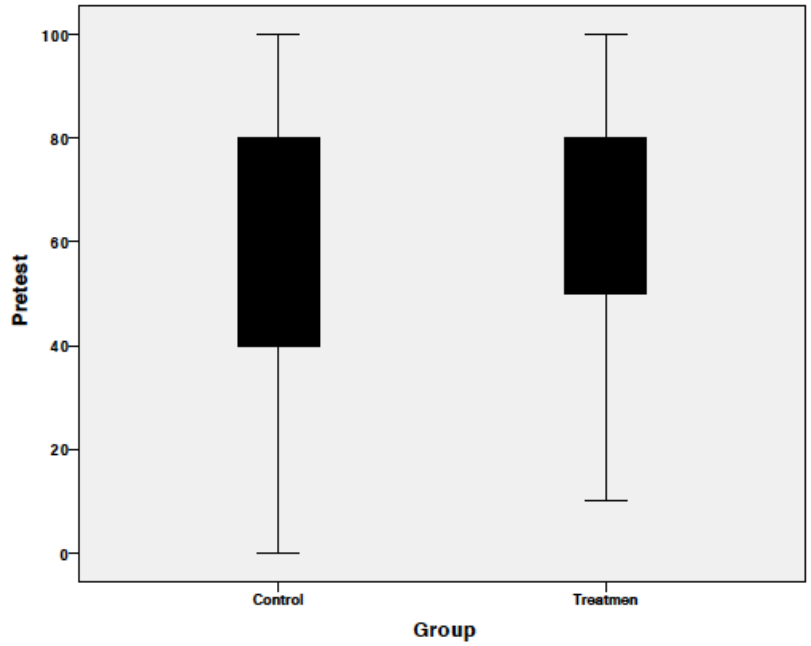
Appendix 6: Study 2 Boxplots and Tests of Normality



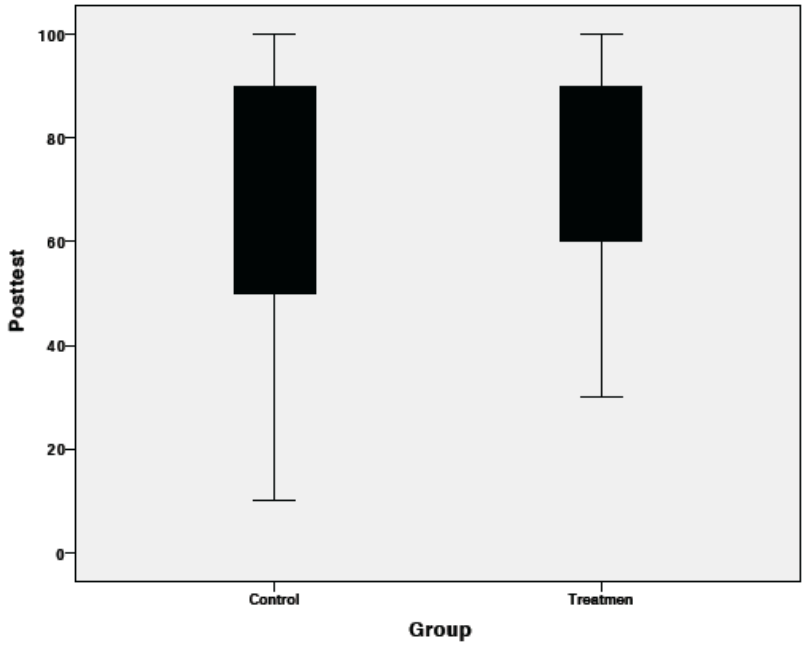
DDM1 (Vietnam) Pre-Test Scores Box Plot – No outliers detected



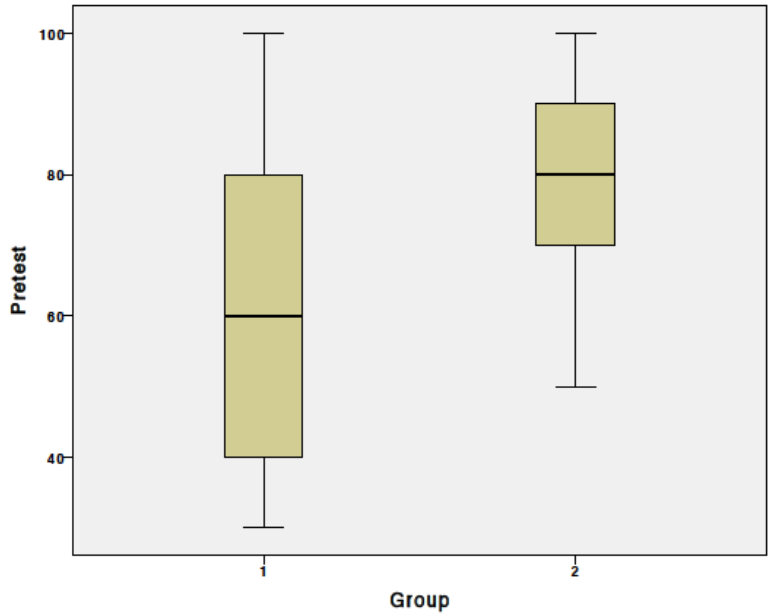
DDM1 (Vietnam) Post-Test Scores Box Plot – No outliers detected



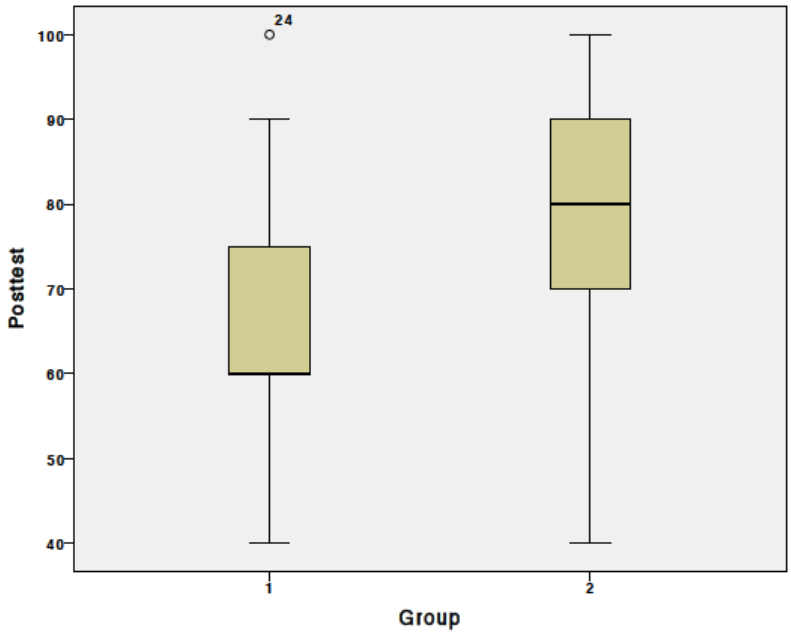
DDM2 (Vietnam) Pre-Test Scores Box Plot – no outliers detected



DDM2 (Vietnam) Post-Test Scores Box Plot – No outliers detected



DDM2 (Melbourne) Pre-Test Scores Box Plot – No outliers detected



DDM2 Melbourne Post-Test Scores Box Plot – Outlier detected

Tests of Normality

	Group	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Pretest	Control	.102	31	.200*	.971	31	.545
	Treatment	.151	45	.012	.972	45	.329
Posttest	Control	.147	31	.086	.963	31	.349
	Treatment	.131	45	.052	.970	45	.283

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Tests of Normality (DDM1 – Vietnam)

Tests of Normality

	Group	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Pretest	Control	.171	30	.025	.950	30	.173
	Treatment	.128	39	.107	.953	39	.105
Posttest	Control	.180	30	.014	.931	30	.051
	Treatment	.147	39	.034	.947	39	.063

a. Lilliefors Significance Correction

Tests of Normality (DDM2 – Vietnam)

Tests of Normality

	Group	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Pretest	1	.206	16	.068	.916	16	.146
	2	.137	17	.200*	.931	17	.230
Posttest	1	.227	16	.027	.928	16	.227
	2	.216	17	.034	.929	17	.207

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Tests of Normality (DDM2 – Australia)

Appendix 7: Study 3 Interview Guide

[A] Feedback

Having spent time playing *Virtual Designer* – what are your thoughts about the main scenarios?

Are the scenarios an accurate representation of real-world situations, ie, client meeting?

What are your thoughts about the overall difficulty level of the main missions? Did you find it too easy, too difficult, or just adequate?

In the survey feedback collected from students, many have described the game as being too difficult, that they were getting too many errors and feeling frustrated. What are you thoughts on this?

Do you have any positive feedback about *Virtual Designer* ?

Do you have any negative feedback about *Virtual Designer*?

Do you have any additional or opinions about digital RPGs for teaching and learning?

[B] Feasability

Do you feel if students will be engaged if they used digital RPGs in class for learning?

As a lecturer, what are your thoughts about the feasibility of using digital games like *Virtual Designer* in class?

Would you use a game like this for the digital media courses you teach?

If you were to use digital RPG for your teaching, how would you implement it? Played during class hours or played outside of class on students' own time?

Would a briefing or debriefing session be necessary to play an RPG like *Virtual Designer*?

[C] Learning Outcomes

Could games like this be used as an effective tool to achieve learning outcomes in digital media education?

Which learning outcomes could best be accomplished by digital RPGs?

Which features or elements of digital RPGs could best be used to overcome teaching challenges?

Appendix 8: *Virtual Designer* Game Design Document

1. Game Overview

This game is developed as part of a proof of concept for a PhD study, which seeks to investigate the effectiveness of using digital role-playing games to achieve learning outcomes in university classrooms. The game is targeted for university students studying in the Bachelor of Design (Digital Media) program. The game is intended to simulate real-world work practices in design studios to create a situated learning environment, preparing digital media students as they transition from educational to workplace settings.

This game is a **single player 3d role-playing game** developed using Unity and is able to be played within web browsers on Windows and Mac OS.

As part of the study specifically investigates the genre of role-playing games, the built-in game mechanics should be identifiable with commercial role-playing games (think Skyrim, Final Fantasy, Red Dead Redemption, etc). The game should have an interesting narrative element. This can be achieved through interesting dialogues with NPCs and changing outcomes of a scenario based on player's decision/performance. There should also be character growth (leveling-up), non-linearity (players can explore or choose missions as they wish) and interaction with NPCs/scene objects.

These are the key objectives/learning outcomes from playing this game:

- To test comprehension students' theoretical design knowledge and have them **apply** that knowledge as practical solutions to different problems.

- Through role-play - to situate learners within a workplace environment – have them see themselves as design professionals and establish a context of real-world problems and practices within the field of design.

- To be familiar and comfortable with the use of design vocabularies. To understand how these words are essential in the practice of design.

- To experience and understand typical workflow processes in design. For example, the process of print-proofing (and the consequences of not doing it right), the process of constructively critique other designers' works, etc.

2. Player Profile

Nationality: Vietnamese or Australian
Age: 19-24
English proficiency: Good
Computer skills: Excellent

Note: NPCs should include Asian characters to simulate local studio conditions". Try keeping a balanced cohort of NPCs with different ethnicity.

3. Leveling Up

A “Designer Meter” gauges Player’s performance. Winning missions increases the meter, allowing level up. Underperforming reduces the meter level and losing missions empties the Designer Meter. Every time a promotion is achieved, a dialogue box appears to inform them with positive encouragement - players can opt to share their achievement on Facebook.

Level Progression:
Intern –> Designer –> Senior Designer –> Junior Art Director –> Senior Art Director
-> LEGENDARY DESIGNER

4. Missions

There are 3 main missions and 3 side missions.

The main missions are accessible through 3 separate office doors. Players will be asked to confirm if they want to start the mission, before the cut scene begins. Main missions will have richer dialogue branching, which leads to different outcomes (3 different cut-scenes). Players who did well in main missions will have a full design meter, thus receiving a promotion. Semi-good performances will have their design meter reduced by half. Players who failed will have their design meter emptied to 0.

The side-missions are accessible by talking to 3 different NPCs. Successful completion of side-missions will increase designer meter, allowing quicker promotion and leveling up.

5. Characters and V/O

All V/Os in this game are subtitled at bottom of screen.

Player character has no V/O.

All main-mission NPCs will have V/O. Main-mission NPCs appear in cut-scenes. Cut-scenes are cinematic (black horizontal bars above and below screen).

3 side-mission NPCs might/might not have V/O depending on budget (*please provide proposed estimate for this with/without V/O.*). Side-mission NPCs are indicated with a special icon, talking to them will begin side-missions. Side-mission NPCs will reward items upon successful completion of missions.

Non side-mission NPCs will not have V/O (about 8 of them?). Players can talk to them for interesting/funny conversations. Simple dialogue branching or no dialogue branching in some cases. One NPC will be the “mentor NPC” – who will talk random design quotes/trivia/tidbits whenever player talks to him.

Important: All voices should be very animated and natural, feels very conversational. Must not sound like boring business games or e-learning applications.

6. Scene Setup

Game scene is within office space. There are 3 closed office doors – entering each door will start a main mission.

One office door is opened, it's labeled as "library". Entering this room opens up a reading materials with images, divided into categories. From here, students can have a quick review on topics to help them accomplish main missions and side missions.

Possible categories:
Colour theory review
Printing review
Typography review
Famous designers

The rest of the office space consists of desks and computers. Some desks are occupied by NPCs, working. Other NPCs are scattered at different locations within the scene, performing different actions.

7. Others

Music style: Chill, relaxed, acoustic guitar maybe?
Sound effects: Mild ambience noise of office. Soft footsteps of player character.
Look and feel: Well-lit scene. Realistic. Creative space, vibrant colours. Scene customised with some design-related assets (posters, books, etc).

Cut-scene characters must be of good-quality and character animation should be acceptably convincing.

Controls: Arrow keys to move or select options. Shift to run. Spacebar to talk. Controls should be responsive and fast.

Options to turn music on/off.
Options to turn subtitles on/off.

Playable on Web-Browser or by installation on computer.

Game-flow

1. Title Screen

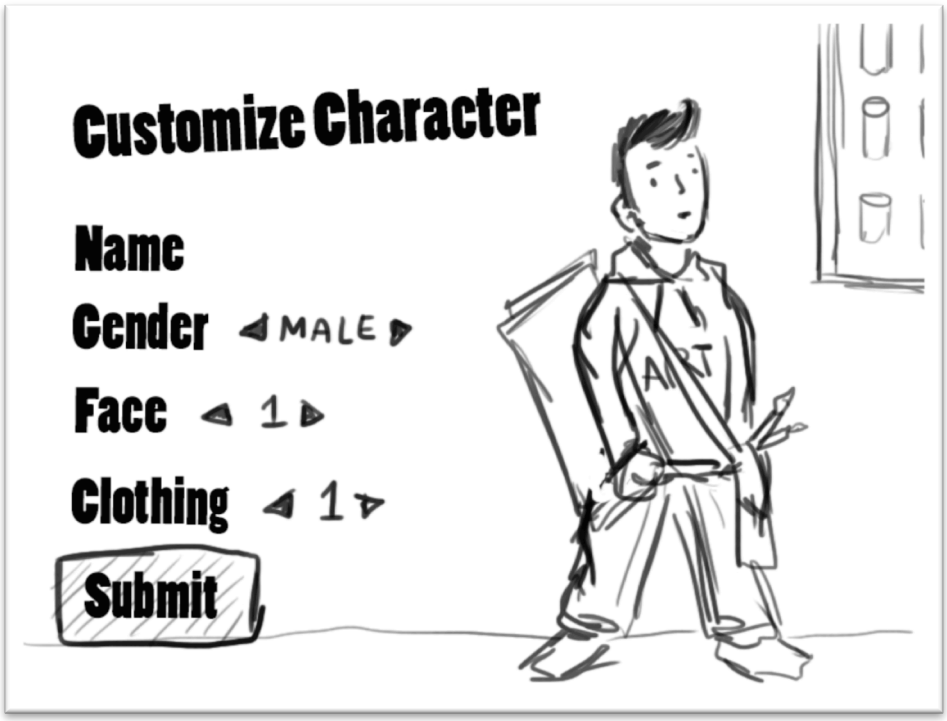
Splash screen of logos – fade into title screen of character standing with some idle character animation against a wall. Some designer posters against the wall.

Buttons:
- Begin <- starts game
- Save/Load
- Credits <- goes to page with rolling credits

2. Avatar Creation

Upon clicking on <Begin> in title screen, screen fades into avatar creation page. Players key in name, select gender, and make customisations on character clothing.

Players click submit to confirm character. <Confirm?> <Yes/No>
If yes, cuts to scene with Staff ID with name, position title and company name.

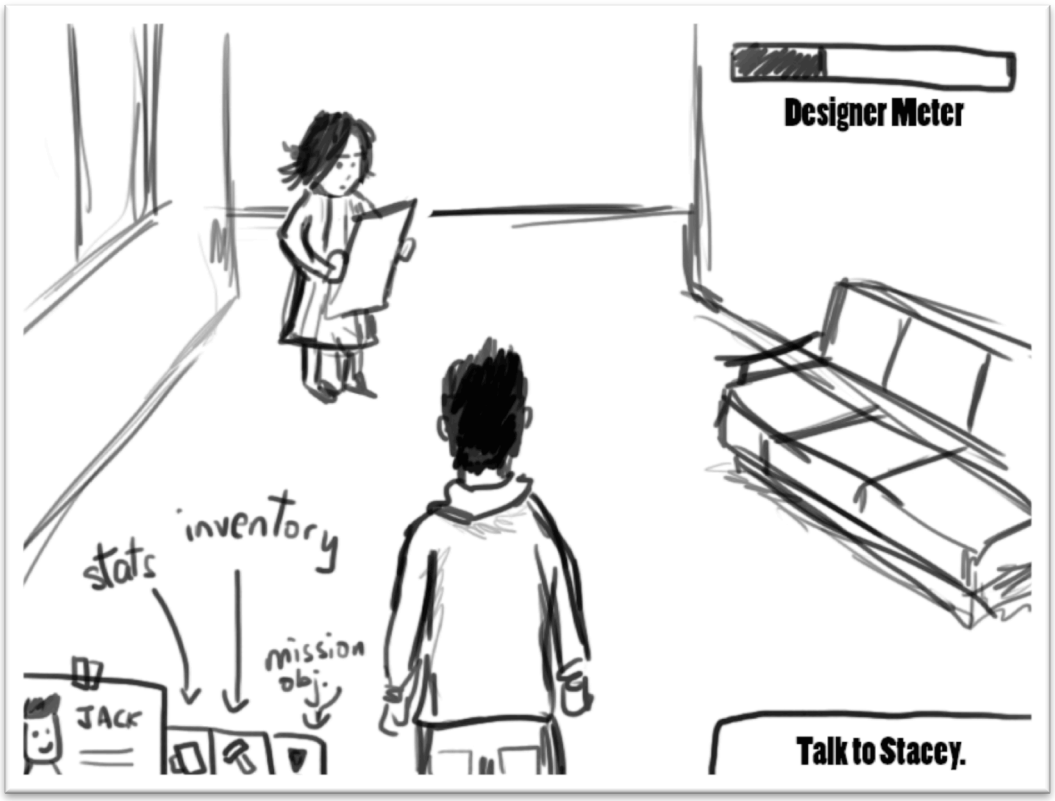


3. Game starts

Scene fades into office entryway with character.

<Hint box: Use the arrow keys to move your character. Hold shift to run.>

Character reaches outside office space. NPC Stacey standing, looking at posters.



<*Hint box: Walk to Stacey*> (players cannot walk past Stacey until they talked to her)

<*Hint box: Hit spacebar to talk*>

[V/O] Stacey: Hey! So you're the new guy/girl. My name is Stacey. Here, follow me, I'll show you where your desk is.

<*Hint box: Follow Stacey*>

[V/O] Stacey: So it's your first day, huh? Must be quite intimidating. I remember my first day when I first started…... Ahh, memories. Anyway, here's your desk (arrives to studio space). Feel free to explore around and talk to people. Designers are sometimes a weird bunch, but they're cool. I'm running off for a client meeting now, it was nice meeting you!

<*Hint box: Explore around the design office.*>
(Bird's eye view establishing shot of camera showing whole scene.)

<*Hint box: You can select main missions by entering through the office doors.*>
(Camera cuts to Office Doors, slow pan.)

< *Hint box: Side-missions can be played by talking to characters with a green icon.*>
(Camera cuts to an NPC with green icon, slow pan.)

< *Hint box: Check out the library if you want to learn some interesting stuff about design.*>
(Camera cuts to an library room, slow pan.)

< *Hint box: The more missions you complete, you fill up the Designer Bar above. You will receive a promotion once the bar is filled. Have fun!*>
(Animated arrow points at Designer Bar.)

Entering a closed office door will start main mission:

Main Mission 1: Print Error

Cut scene. (Horizontal black bars appear at top and bottom in all cut scenes)

[V/O1] Don: Hey, new guy/gal! Come on in, come on in… I need this done urgently and our intern who's been working on this called in sick today.

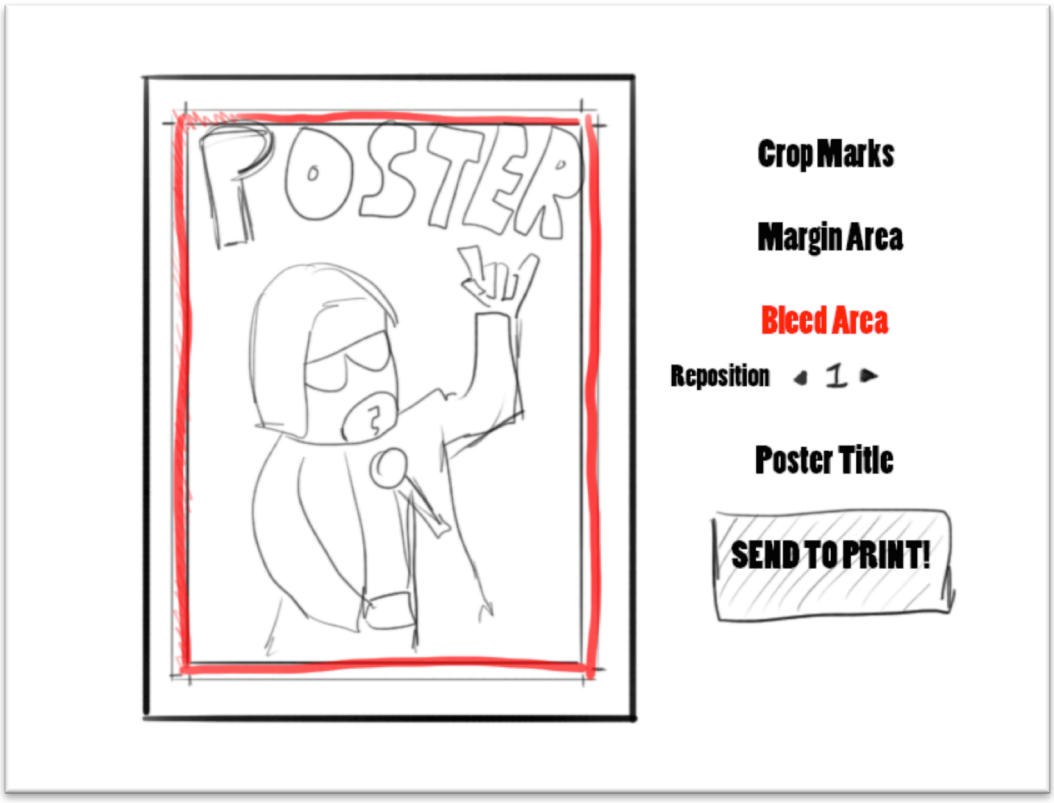
[V/O2] Don: Now, would you look at this poster - it's full of rookie mistakes! We really need to send this out to the printer this evening. I want you to look through this carefully and get all the problems fixed for me ASAP.

Option 1: No problem! (goes to V/O3)
Option 2: Umm…… I'll come back later. (goes to V/O4)

[V/O3] Don: Seriously - make sure you check through this CAREFULLY, ok?! We're printing out 5,000 copies of these. Make sure the type and print marks are all set up correctly. We can't afford any errors. If anything goes wrong, I'm holding you accountable! (scene cuts to poster)

[V/O4] Don: Well, ok, come back quickly when you sort it out. I need you back here to fix this mess for me. (scene fades back to studio space)

Mission starts:



Players “fix” errors in the posters by making selections. Areas affected will be highlighted in red as players scroll to selections. There should be a reset button to set everything back to default. Possible example of errors: (There will be between 10-15 items to adjust in this poster)

- Typo error – fix typos
- Bleed area – Redefine bleed area
- Crop marks – reposition crop marks
- Adjust header colour – bad contrast
- Fix alignment

Option 1: Send to print! (Plays outcome)
Option 2: No, wait, I better double check this again… (Back to poster)

(Selecting Option 1 will play cut scene – 3 possibilities:)

1st possibility: If player spotted all errors correctly

[V/O5] Don: Hey, the printer just sent us the printed copies of that poster you helped fixed the other day. It’s PERFECT! I’m impressed. Keep up the good work! You are starting out quite nicely as a great designer!

Dialogue box appears: Shows score. Performance grade: A

(Design meter fills up to full - Level Up!)
<Dialogue box: You spotted all type and print errors correctly - You received a promotion! Keep up the good work!>

2nd possibility: If player missed spotted less than 2 errors

[V/O6] Don: Hey, the printer just sent us the printed copies of that poster you helped fixed the other day. Just look at this, you missed out a few parts here and there. Did you really check this through before you sent it for print? Next time you make costly mistakes like this again - you're getting fired!

Dialogue box appears: Shows score. Performance grade: B

Review - showing an image example of a poster labeled with print marks, bleed, etc.

(Design meter reduces by half)
<Dialogue box: Your boss is angry. You didn't spot all type and print errors correctly. Would you like to try again?>

Option 1: Yes (restarts Mission 1 cut scene)
Option 2: No (fades back to studio space)

3rd possibility: If player missed more than 2 errors

[V/O7] Hey, the printer just sent us the printed copies of that poster you helped fixed the other day. Just look at this, it's full of errors! What did I told you earlier!? Did you really check it through? Now we have 5000 copies of posters, which we can't use! Oh, I am SO FURIOUS right now. You just cost us a lot of money! I'm sorry but I'm going to have to let you go.

Dialogue box appears: Shows score. Performance grade: C

Review - showing an image example of a poster labeled with print marks, bleed, etc.

(Design meter reduces to zero)
<Dialogue box: Yikes, you made your boss very angry – and you just got fired! Would you like to try again?>
Option 1: Yes (restarts Mission 1 cut scene)
Option 2: No (fades back to studio space)

Mission 2: Colour Trouble

Li sitting at computer desk, working in frustration. Player walks into office.

[V/O8] Li: Oh good, you're here. I've been working on this the past few hours and it's giving me a *massive* headache. The client is asking for different colour variations of their packaging design. Think you have time to help me out?

Option 1: No problem! (goes to V/O9)
Option 2: Umm…… I'll come back later. (goes to V/O10)

[V/10] Li: Come back whenever you have time and help me out, ok? I'm counting on you!
(Fades back to studio space)

(Mission Starts)

Packaging appears.

[V/O9] Li: Ok, so check this out – this is the packaging design I have. The client is still not too happy about the colour, so I'm going to send over different versions to let him choose from.

[V/011] Li: All right, let's start this off easy. Let's go with an overall warm tone for this packaging.

(Correct answers will give positive responses, and moves on to the next question)
[V/012] Li: Great!
[V/013] Li: Awesome!
[V/014] Li: Woah, you're quite the expert in colour, aren't you?
[V/015] Li: That's brilliant!
[V/016] Li: You're a genius!

(Incorrect answers will give negative responses, and moves on to the next question)
[V/O17] Li: Umm, hello, colour theory 101?
[V/O18] Li: Uhh, no, that's not correct.
[V/O19] Li: Gee, what did they taught you at design school?
[V/O20] Li: Come on now, that's not right!
[V/O21] Li: Uh oh. Someone needs to study up colour theory…

Questions:
[V/O22] Li: Now let's do a split-complementary colour scheme.
[V/O23] Li: Ok, can you change it to a monochromatic colour scheme instead?
[V/O24] Li: How about a triadic?
[V/O25] Li: Now… let's pick a colour to make the texts contrast from it's background. <pick colour>
[V/O26] Li: Hmmm… let's try increasing the saturation, maybe that will make the texts pop more from it's background.
[V/O27] Li: I think the background needs higher value. Give that a try.
[V/O28] Li: Now's let's limit the colours to tertiary colours only.

3 possible outcomes:

Outcome 1: Excellent performance

(cutscene)

[V/O29] Li: Wow, you really know your colour theory, huh! That's awesome. You know, lots of designers actually struggle a lot with these. Next time I need help in colour, I know who to look out for.

Dialogue box appears: Shows score. Performance grade: A

(Design meter fills up to full - Level Up!)
<Dialogue box: You spotted all type and print errors correctly - You received a promotion! Keep up the good work!>

Outcome 2: Medium performance (a few incorrect)

[V/O30] Li: Hmmm, I think you need to revise on your colour theory a little. Made a few mistakes here and there just now. You better brush up on this, ok? If you don't know your colour theory, it's difficult to create good design!

Dialogue box appears: Shows score. Performance grade: B

(Design meter reduces by half)
<Dialogue box: You didn't quite get all the colour settings right earlier. Would you like to try again?>

Option 1: Yes (restarts Mission 2 cut scene)
Option 2: No (fades back to studio space)

Outcome 3: Mediocre performance (many incorrect)

[V/O29] Li: Whoops - You made quite a few errors there earlier. You seem a little rusty! You better study up soon or you're in for a lot of trouble if you don't know Colour Theory 101. It's the fundamentals that every designer needs to know!

Dialogue box appears: Shows score. Performance grade: C

(Design meter empties)
<Dialogue box: You didn't quite get all the colour settings right earlier. Would you like to try again?>

Option 1: Yes (restarts Mission 2 cut scene)
Option 2: No (fades back to studio space)

Mission 3: The Boardroom

(cutscene)

[V/O30] Mike: Hey! Come on in. We have a crisis here! Jake was supposed to pitch our design to some clients today, but he's late! We'll need to have a talk with him later… but anyhow, the

clients are already waiting in the boardroom. I don't want to keep them waiting any longer. Think you could do the pitch?

Option 1: No problem! (goes to V/31)
Option 2: Umm…… I'll come back later. (goes to V/O32)

[V/O31] Mike: OK. Here - have a quick read of this concept document. I need you to understand the whole concept and rationale behind the design of this logo. And then, you'll need to pitch our idea to clients and convince them to LOVE this design.

(Dialogue box pops open, showing the image of the logo, some text at the side explaining the concept of the logo and brief description on rationale of the design)

[V/O33] Mike: Just use your design knowledge to justify why this is a great design, and you'll be fine. If they have questions, answer them. You're the design expert, after all! Think back to the fundamentals – design elements, design principles, colour theory, typography, etc. We're counting on you, buddy! Good luck!

(cutscene to boardroom, 2 NPCs seated, logo design is displayed on whiteboard)

Scene cuts to player character standing next to whiteboard.

Player starts pitching:

Here is our design. It is primarily based on….
Option 1:
Option 2:
Option 3:
Option 4:
Option 5:

The colour scheme we used for this logo was…
Option 1:
Option 2:
Option 3:
Option 4:
Option 5:

Camera cuts to client 1.

[V/O33] Client 1: That's an interesting colour scheme. (If first 2 questions answered correctly.)
[V/O34] Client 1: Hmm. I'm not too sure about that. (If first 2 questions answered wrongly.)

And the reason we went with this colour scheme, was because…
Option 1:
Option 2:
Option 3:
Option 4:
Option 5:

The shapes of the logo are abstractions of…
Option 1:
Option 2:
Option 3:
Option 4:
Option 5:

As your company products has been on the market so many years, it's important that…
Option 1:
Option 2:
Option 3:
Option 4:
Option 5:

Camera cuts to client 1 and 2.

(If questions answered correctly – clients look at each other, smiles and nods.)
(If questions answered wrongly – clients look at each other, frowns and shakes head.)

And let's look at the type. We decided that the type should be a…
Option 1:
Option 2:
Option 3:
Option 4:
Option 5:

The font colour used is …
Option 1:
Option 2:
Option 3:
Option 4:
Option 5:

This works well against all backgrounds, because it gives good…
Option 1:
Option 2:
Option 3:
Option 4:
Option 5:

Camera cuts to client 2.

[V/O33] Client 2: I have a question – our logo will be displayed at varied sizes. From very large billboards to the size of a business card. How good is the scalability of this logo design?

We took that into careful consideration when we designed this logo. In making sure that the logo can be flexibly used for all print sizes, we needed to ensure that…
Option 1:
Option 2:
Option 3:
Option 4:
Option 5:

One way to do that is by adjusting….
Option 1:
Option 2:
Option 3:
Option 4:
Option 5:

And by increasing it here, it helps…

Option 1:
Option 2:
Option 3:
Option 4:
Option 5:

[V/O34] Client 1: It's a very nice logo design, but I am still not convinced about the use of red colour for the symbol. I think pink looks prettier, don't you think, Rich?

[V/O35] Client 2: Well… I don't know about that…

Actually there's a reason why red was used here. Red often represents…
Option 1:
Option 2:
Option 3:
Option 4:
Option 5:

Because your company's motto is "some cool motto"…
Option 1:
Option 2:
Option 3:
Option 4:
Option 5:

That is the end of my presentation. Thank you very much.

3 possible outcomes:

Outcome 1: Excellent performance

(cutscene)

[V/O36] Client 1 (shakes hand with player): What a fantastic presentation! We are very happy with the logo design and feels that it fits perfectly with the identity of our company. You did a very good job walking us through the thought process involved in designing this logo. Let's go with this design. We look forward to work with you again.

Dialogue box appears: Shows score. Performance grade: A

(Design meter fills up to full - Level Up!)
<Dialogue box: You performed the perfect pitch! You received a promotion! Keep up the good work!>

Outcome 2: Medium performance (a few incorrect)

[V/O37] Client 2: Well, we are not entirely convinced about the design of this logo. We feel that some aspects of the logo design were not well-presented. We can't accept this logo design at this point of time. Send us more alternative designs to have us look through, because we are not happy with this design.

Dialogue box appears: Shows score. Performance grade: B

(Design meter reduces by half)
<Dialogue box: You didn't quite present the perfect pitch. Would you like to try again?>

Option 1: Yes (restarts Mission 3 cut scene)
Option 2: No (fades back to studio space)

Outcome 3: Mediocre performance (many incorrect)

[V/O38] Client 2: We were quite disappointed with the presentation. You seemed very unprepared. I hope your company is taking our logo design seriously, because we are very unimpressed so far. You do realize that there are many other studios we could work with instead? We'll talk with your boss tomorrow.

Dialogue box appears: Shows score. Performance grade: C

(Design meter empties)
<Dialogue box: You presented the pitch poorly. Would you like to try again?>

Option 1: Yes (restarts Mission 3 cut scene)
Option 2: No (fades back to studio space)

Side-missions:

No cut-scenes. Just talk to NPC.

Side mission 1: Identifying different art-styles, designer works

NPC says, "Please bring me one of David Carson's works.", or "Please bring me a print-out of an Modernist style poster." Player will then pick through a selection of artworks hanging on the wall.

If player fails repeatedly in this mission, they will be referred to the library. An incorrect answer will reduce ¼ of design meter. A correct answer will increase ¼ of design meter. There are a total of ten questions. Players can approach NPC to answer one question at a time.

Side mission 2: Dealing with clients
NPC hands a phone to player, a client on the line. Client has inquiries, seeking advise about printing sizes, book binding, etc. Players must use knowledge on printing and answer inquiries correctly. Some dialogue branching – the more wrong answers, the angrier the response.

Outcome
1. Correct answers – client happy – add 1/2 designer meter.
2. Some incorrect answers - client annoyed – reduce 1/2 designer meter.
3. Many incorrect answers - client angry - slams phone – empties designer meter.

Side mission 3: Quiz
"Hey, new guy/new girl. They told me you just graduated from design school. Let's see how much you know about design." Simple Q and A challenge, random questions with timer. Answer as many questions correctly as possible within 30 seconds. High score adds increases ½ designer meter. Medium score reduces 1/2 designer meter. Poor score empties designer meter. Players can attempt this challenge as many times as they wish.